SMELTER SYMPOSIUM
WEDNESDAY, DECEMBER 06, 2006

PARIA SUITES HOTEL
LA ROMAIN

Symposium began at 9.10 a.m.

Mr. Rampersad Motilal (Chairman): Minister of Energy and Energy Industries, Sen. the Honourable Dr. Lenny Saith, Fr. Michael Moses, member of the International Religious Organization, members of the South Chamber of Industry and Commerce, distinguished speakers and presenters, members of our expert panel, representatives of the various civil organizations and other delegates, members of the media, Ladies and Gentlemen. On behalf of the South Chamber of Industry and Commerce, it is my pleasure to welcome each of you to this National Symposium on the Aluminum Industry.

I also wish to welcome members of the national community listening to us over the radio and Talk City 91.1FM, as well as viewing the proceedings on Caribbean News Media Group CNG Channels 9 and 13, which is also carried on Cable Channel 6.

The objective of today's symposium is to provide information and promote discussion on issues pertaining to the potential development of an aluminum industry in Trinidad and Tobago. As we are well aware, there are proposals for at least two (2), and possibly three (3), aluminum smelters here in Trinidad and Tobago. These include the 125,000-metric tonnes per year Alutrint Joint Project between the Government of the Republic of Trinidad and Tobago and the Venezuelan firm Sural, which is proposed for the Union Estate in La Brea. The Government, through the NEC has a 60% stake in Alutrint with Sural owning the remaining 40%. Some 65,000 metric tones of the output from this plant are targeted to be further processed downstream into rods, billets and bars with approximately 60,000 metric tonnes for further use in the manufacture of aluminum wire, insulated cable and additional rods and bars.

Another smelter project is proposed by Alcoa and this is expected to be located in a new industrial estate in Chatham, Cap de Ville on the Southwest Penninsula. This plant is expected to produce some 341,000 tonnes per year of aluminum ingots. The current project scope provides for 240,000 tonnes to be further processed to produce extrusion billets and other stocks.

This plant is expected to occupy some 450 acres and includes a 200-acre buffer zone. There have been several concerns raised about these smelters by members of the national community with a particular focus on environmental issues and on the extent of the economic benefits that could be realized by the country. These concerns have sparked public interest in this debate. However, a recent survey published in one of thee daily newspapers revealed that close to 50% of respondents did not feel they had been sufficiently informed to offer a reasoned opinion about the development of an aluminum industry in Trinidad and Tobago. It is necessary, therefore, that as much information as possible is made available to the general public and to promote discussion based on facts and informed opinion.

As mentioned previously, the objective of this symposium is to provide information pertaining to the potential development of an aluminum industry in Trinidad and Tobago. We have therefore come together today to engage in discussion and to get as much factual information as we can on the industry.

Some of the questions to which we all seek answers are as follows: Will the introduction of the aluminum industry significantly further the country's development relative to other available options? What model of such industry is appropriate for our small twin-island State? What are the downsides associated with any chosen model and how can we ensure that these are minimized if not eliminate entirely? What can we do to strengthen the capability and performance of the various agencies and institutions whose task it is to safeguard the interest of the public so that any new development is done in accordance with prescribed standards?

These are not simple questions to answer. In the past year there has been much public debate on some of these issues. Various persons and groups have expressed a range of views. It is of course important that views are formulated from the best information available on which reasoned discussion can take place and some consensus arrived at.

During today's proceedings we expect to be exposed to various views from experts in particular areas of knowledge. As one of our speakers, Prof. Julien Kenny, recently mentioned in one of his published articles and I quote:

"A symposium is generally accepted to be a conference of professionals to discuss academic or specialist subjects very often with chronicle progress in the development of knowledge of the subject material."

Consistent with that definition we have assembled here today experts in environmental management, economics, public health and other fields relevant to the aluminum industry. We have also invited a very broad cross-section of the national community to participate in this symposium. Invitees include persons and groups from all walks of national life, many of whom have been involved in these issues over the past year. The full list of participants and the agenda for today's symposium have been published in the daily media, including the speakers and members of the expert panel.

Several comments have been made in the media about the Chamber's decision to invite a representative cross-section of delegates rather than simply make the symposium open to the general public. You will appreciate that in a forum like this it would be impractical, if not impossible, to accommodate everyone who is interested in attending. However, we sought the widest possible degree of participation by both direct and indirect stakeholders through the invitation of delegates.

We believe that an examination of the list of invitees, speakers and topics will satisfy you that this event is meant to be inclusive of the broadest range of views and to provide for the widest possible dissemination of information. We wish to advise attendees and the general public that all presenters today were allowed full discretion to determine the content of their presentation. Our only constraint was one of time to facilitate as many speakers as possible while allowing delegates to have meaningful discussions on the issues raised. We have sought to achieve a balance between the time allocated to speakers and questions from the public.

Looking ahead, today's symposium is expected to be one of many which will be taking place over the next months on this topic. Indeed University of the West Indies has already advised that they will be hosting their own conference in January. The South Chamber welcomes all such initiatives as we feel that each successive event will be able to build on the information and learning of the one preceding it.

The role of the South Chamber here today is simply to facilitate the process of discussion and the sharing of information and to ensure the smooth flow of events. The

South Chamber considers today's dialogue to be of critical importance to the country. Since its establishment 50 years ago, the South Chamber has been at the forefront of national development and national discussion. In this role we have always advocated and facilitated national dialogue on critical issues and we believe that this is one such issue. I hope that you will find today's proceedings to be enlightening and at the same time thought-provoking. Like you, I am also interested in hearing what our various presenters and panelists have to say on this important subject. Let us, therefore, go directly to the next item on the agenda.

Our feature speaker this morning needs no introduction. I refer to Sen. the Hon. Dr. Lenny Saith, Minister of Energy and Energy-based Industries who will share with us Government's perspective on the development of an aluminum industry in Trinidad and Tobago. I now invite Dr. Saith to address us. Dr. Saith. *[Applause]*

Dr. the Hon. Lenny Saith, Minister of Energy and Energy-Based Industries: Thank you, Mr. Chairman. President of the South Chamber of Industry and Commerce, other members of the Head Table, industry stakeholders, participants in the symposium, members of the media, distinguished Ladies and Gentlemen. We are gathered here today for a very important discussion in national development. We must decide on the way forward for the establishment of an aluminum industry in Trinidad and Tobago. I wish to thank the South Chamber of Industry and Commerce and the University of the West Indies for facilitating this national debate by way of this symposium.

This forum, I believe, offers an opportunity for the presentation of facts and the airing of concerns on this matter. I wish to encourage calm and objectivity as we seek to chart the way forward.

My intention this morning is to set the stage for the discussions by presenting the Government's policy framework for the development of an aluminum industry. In doing so, I will outline the origins of the policy, and the anticipated benefits this industry will bring to our nation.

A key element in the proposed aluminum industry in Trinidad and Tobago is the existence of significant reserves of natural gas. In the early years of our energy sector, natural gas was mainly produced in association with normal crude oil production, and

those of us who are old enough to remember, most of it was flared; flared at Pointe-a-Pierre; it was burnt; it had no value.

But during the course of the period, we have learnt the importance of natural gas and as it continued to emerge the Government recognized it as the next commercially exploitable hydrocarbon resource capable of generating significant revenue. It was found that the chemical composition of our natural gas made it ideal for use, inter alia, as feedstock for the petrochemical and steel industries and as a clean source of fuel for electricity generation for various types of industry, including large-scale energy intensive industries such as the production of steel and aluminum.

Over the years, the Government has utilized our natural gas in the manufacture of petrochemicals and fertilizers, in electricity generation for iron and steel and more recently in the production of LNG.

The records will show that since the late 1960s, Governments ―and I use the word "Governments"―have been giving consideration to the establishment of an aluminum industry in this country. Every decade thereafter saw various administrations either reviewing proposals tabled by companies or commissioning studies on the benefits of the industry to the country. The aluminum industry was seen as one of very significant strategic importance for the diversification of the nation's economy.

Beginning in the 1970s, the Government reviewed proposals for the establishment of an aluminum smelter in Trinidad and Tobago and held discussions with the Governments of both Guyana and Jamaica on this issue. Policy position was clearly articulated in 1977 at the commissioning of the country's first iron and steel facility. The country's first Prime Minister, the late Dr. Eric Eustace Williams, then stated that the thinkers of the day were recommending: "that Trinidad and Tobago should just sit back, export our oil, export our gas, do nothing else and just receive the revenues from such exports and lead a life of luxury at least for some time". His view was that this approach was tantamount to putting the whole nation on the dole. Instead, he saw an excellent opportunity for industrialization, economic diversification and the development of production capacity. And so, he led Trinidad and Tobago to enter, again in his words: "the world of steel, aluminum, methanol, fertilizers and other petrochemicals in spite of our small size and limited technology".

The country has reaped tremendous benefits from that policy position. It was a key factor in the subsequent rapid development of the Point Lisas Industrial Estate with its various gas-based industries and its impressive infrastructure including the improvement of the Port of PLIPDECO. The Government also established the National Gas Company (NGC) and the National Energy Corporation (NEC) to manage the nation's commercial arrangements for the natural gas sub-sector and to continue the development of the necessary infrastructure. Indeed, it is clear that without this gas-based industrialization strategy, our gas reserves would have remained severely underutilized. Instead, today, our natural gas sub-sector is among the most referenced success stories in the global energy arena.

As you all know, we are now the world's number one exporter of ammonia and methanol from a single site. We are the largest exporter of LNG to the United States, and we have an increasingly vibrant iron and steel industry.

These industries have undoubtedly brought significant economic benefits to our nation. However, they are not very large employment creators and offer limited opportunity for the establishment of local enterprise and the export of high value added products.

We therefore need to expand our industrial base for the further development of our country. Diversification of the economy is at the heart of all our plans. Through the energy sector, we are promoting the establishment of downstream industries which add value and which will generate economic multiplier effects, through the creation of linkages between the energy sector and the rest of the economy. We are seeking new investments which will both deepen and widen the nation's productive base and generate new manufacturing activity in Trinidad and Tobago.

All new proposals in downstream natural gas must include the development of a higher value product. Consequently, now at various stages in the pipeline, are proposals representing more than US$8 billion in direct foreign investment; and which will revolutionize the economy of this country by generating a whole new wave of manufacturing activity. To support this concept, new projects include:

- Complexes for Ethylene and Polyethylene and also for Propylene and Polypropylene to develop the plastics industry;

- ❖ An Acetic Acid Plant and Malaelic Anhydride Processing Facility for downstream activities in the area of food and beverage, pharmaceuticals and resins;
- ❖ A US$1.2 billion petrochemical facility for the production of Melamine and Urea Ammonium Nitrate to generate new industries in a wide variety of areas including furniture, and construction; industrial paints and dinnerware;
- ❖ A US$1.5 billion integrated iron and steel complex by ESSAR of India to produce, *inter alia*, flat plates that will provide the platform for the emergence of new manufacturing activity; and
- ❖ A Foundry Industry to produce pig iron for the further manufacture of steel and steel products.

We are now for the first time approaching a very real way, the establishment of an aluminum industry in Trinidad and Tobago. This can bring very significant benefits to this country. Globally, the aluminum industry grows on average by 2% a year. This year alone aluminum prices have grown by 16%. Because of its properties, aluminum is used in a wide variety of manufacturing activity from household goods to transportation and pharmaceutical industries. The establishment of an aluminum industry therefore presents excellent prospects for greater industrialization, economic diversification, technology transfer, wealth generation and the creation of sustainable jobs in Trinidad and Tobago. Let me now present, in synopsis, the benefits to be accrued to Trinidad and Tobago from the two proposed smelter plants.

Alutrint: Let us first examine Alutrint. During construction approximately 2, 300 persons will be employed for a period of two (2) years. A permanent workforce of 1,000 will be employed in the operation of the plant and in the downstream activity.

Very significantly, 100% of Alutrint's output will remain in the country for the development of local downstream activity. The Alutrint project will therefore create more employment opportunities than the traditional primary gas processing industries. The intention is that approximately 120,000 tonnes will be utilized for a rod mill plant. Of this amount, 35,000 tonnes will be allocated to an alloy rods and continuous bar plant, 5,500 tonnes to a wire and cable plant and 30,000 tonnes will be allocated to a billets and

bars plant. The output of the billet and bars plant will supply 20,000 tonnes to a wheel plant and 10,000 tonnes to an auto parts plant. This approach will generate downstream businesses requiring investment on a scale that would be quite attractive to the local entrepreneur.

Further, the Alutrint project is being undertaken in partnership with international companies with considerable experience in the aluminum industry. The transfer of technology and expertise will be made part of the contractual arrangements. The project involves a collaborative effort between the Government of Trinidad and Tobago and the Peoples Republic of China for technology design and transfer. Alutrint has signed a Technical Agreement with the China National Machinery and Equipment Import and Export Corporation (CMEC) for the provision of the design and engineering of the smelter component of the project. The design and engineering for the downstream component of the proposed project is being led by Sural, the Venezuelan company, which has 40% equity in Alutrint.

Alcoa: Alcoa will be a new fully modern plant representing an investment of at least US$1.5 billion. During a two- to three-year construction period, approximately 2,500 people will be employed. During operation, there will be 800 full-time jobs in the operation of the plant. Further employment will be created as the downstream industries develop.

Skills training will be made available to residents of Trinidad and Tobago. It is our goal with Alcoa to have the highest local percentage possible for operations and maintenance of the facility.

A portion of Alcoa's output will also be sold domestically. Alcoa will be making contributions to community development and will work in partnership with local communities.

The smelter will be located within a 1500 acre site, of which approximately one third is needed for the manufacturing facility. The rest of the land will be jointly managed by Alcoa and the National Energy Corporation in collaboration with the community, government agencies, and the university system in Trinidad and Tobago.

The goal for the land is to enhance agriculture, wildlife, and the preservation of the natural environment.

The matter of relocation is a most critical and sensitive issue. This will be done with respect, dignity, adequate compensation and based on the individual and collective interest. Alcoa will also build a new 900 megawatt power plant. This will supply power to the smelter, but is expected to be also connected to the local grid, thus enhancing its reliability and stability.

The Alcoa plant will also advance the cause of regional economic integration. It will source alumina primarily from Jamaica and possibly from Surinam. This will provide a significant fillip to the Caricom Single Market and Economy and by itself will create new regional economic activity well in excess of US $100 million per year. Alcoa will, therefore, contribute to strengthening the second largest market of Trinidad and Tobago, which, in turn, will increase the export earnings of this country.

These two investments by Alutrint and Alcoa will strengthen the industrial base of our country and diminish our vulnerability to the volatility of the international energy markets.

Like all projects, construction of these two plants will be subjected to the rigorous regulatory process of the Town and Country Planning Division, the Environmental Management Authority and other relevant regulatory agencies before construction actually takes place. Let me repeat that: Like all projects, construction of these two plants will be subjected to the rigorous regulatory process of the Town and Country Planning Division, the Environmental Management Authority and other relevant regulatory agencies before construction actually takes place.

Ladies and gentlemen, I have presented to you some of the facts pertaining to the emergence of our energy policy and to the benefits that will derive from the establishment of the proposed aluminium industry in Trinidad and Tobago. This gathering here today is evidence of the strength of our democracy. Public opinion in this country is as strong as our administration's commitment to the democratic principle of consultation with the national community. I feel certain that this symposium will help significantly to determine how we establish an aluminium industry for the benefit of present and future generations of Trinidad and Tobago.

Ladies and gentlemen, I thank you.

Mr. Chairman: Thank you very much, Dr. Saith, for that very comprehensive address. Despite his busy schedule, the Minister has kindly consented to stay with us a while to listen to some of the presentations and comments, and we welcome him to remain with us.

Ladies and gentlemen, we have today assembled a panel of experts, as I mentioned before, in several areas relevant to our discussions today, whose role is to comment or share an opinion on issues which may be raised during our presentations or respond to questions from the floor.

Members of the panel are already seated at the head table. At this point, permit me to introduce the various members of our panel. In no particular order, I will briefly introduce each member and kindly ask them, just by show of the hand, to identify themselves to the audience.

Our first panelist is Prof. Dennis Pantin. Prof. Pantin is Professor in the Economics Department of the University of the West Indies, St. Augustine, where he also serves as head of the department and Coordinator of the Sustainable Economic Development Unit (SEDU). He is a graduate of the Economics Department, University of the West Indies, St. Augustine and also the Institute of Developmental Studies, University of Sussex.

Our next panelist is Dr. Mukesh Khare. Dr. Khare is Professor in the Faculty of Engineering at the University of the West Indies. Prof. Khare is on the editorial board of the International Journal of Environmental Waste Management and guest Editor on special issues on Urban Air Pollution, Control and Management.

We have with us this morning, also, Dr. Rene Monteil. Dr. Monteil is the Executive Director of the University of Trinidad and Tobago. He is a member of several boards including e-TecK, Caribbean Industrial Research Institute, Niherst and the Institute of Marine Affairs.

We are delighted to have Mr. Glen Goddard, Manager of Technical Services at the Environmental Management Authority. Mr. Goddard oversees the implementation of four significant pieces of environmental legislation, including the Certificate of Environmental Clearance rules. He also maintains managerial oversight over environmental projects executed under Government's PSIP including new lead

assessment projects and air and water quality studies and also international environmental conventions such as the Basel Convention.

Our next panelist is Mr. Frank Look Kin. Mr. Look Kin is President of the National Gas Company of Trinidad and Tobago. Mr. Look Kin also serves as a Director of several companies including Phoenix Park Gas Processors Limited, Atlantic LNG Company, National Enterprises Limited and National Quarries Company Limited.

We have with us also this morning, Dr. Steve Smith. Dr. Smith is President of the Council of the Medical Board of Trinidad and Tobago since 2003. He also formerly served as Vice President of the Council for the period 1992—1994.

We are joined today also by Dr. Victor Coombes. Dr. Coombes is no stranger to the industry and has a long and notable career in the area of occupational health.

We are delighted to have with us today, also, Mr. Erik Keul. Mr. Keul is Vice President, Marketing, at Alstom Engineering in Norway. A significant part of Mr. Keul's working career has been spent in environmental control with emphasis on the worldwide aluminium industry.

Our final panelist is Mr. Prakash Saith. Mr. Saith is President of the National Energy Corporation of Trinidad and Tobago Limited. He is a Civil Engineer by training; a holder of B.Sc and M.Sc in Construction Engineering from the University of the West Indies and is affiliated with several professional organizations.

I will now invite members of the panel to make a brief opening comment if they so desire, in the order in which they were introduced. My only constraint would be, given the time period, if we could limit any comments to a maximum of, let us say, two minutes.

Prof. D. Pantin: Thank you, Mr. Chairman, I will try to speak quickly. Minister Saith, distinguished members of the head table and the audience, media and so on, let me begin by congratulating the Government of Trinidad and Tobago for responding to the valid and legitimate concerns of many people in the society about proceeding with such aluminium smelters without the opportunities for participation of the society.

The fact, however, that this symposium is being held for one day, and by invitation only, suggests that this is really the initiation of a process, not the end of a process. I am happy that the Chairman mentioned the initiatives of the University of the

West Indies. There is also the initiative of something called the Sustainable Development Network which I will speak of a little later if I get a little more than two minutes to speak, hopefully.

Let me just add one or two comments on Minister Saith's contribution which, I think, explored very clearly and articulated the pros of aluminium smelters. Just two comments.

I am a little surprised at his citing Dr. Williams as claiming in 1977 that the thinkers were proposing the continued export of oil rather than processing. Surprising because a decade before, in 1967, Havelock Brewster and Clive Thomas, two Caribbean Economists, produced a study on regional economic integration in which they proposed regional structural linkages including, incidentally, aluminium smelters linking the energy of Trinidad and Tobago and the bauxite of Guyana and Jamaica. So, I am not too sure, in effect, if Eric Williams did say that.

I am also interested in his closing comments where he said that the projects will be subject to rigorous review by the regulatory bodies before construction begins. It is my understanding that the regulatory bodies may conclude, based on the evidence, that construction may not begin or may not happen in any instance. Therefore, I am a little concerned at what appears to be, in a sense, a conclusion including the related conclusion that relocation will be handled in a sensitive manner. I do not wish to sour your mood, but I wish, on the very onset, to say that it seems to me that this is the initiation of a process and that process needs to be open-ended enough to draw a conclusion on whether construction would begin or ought to begin in either or both of those projects. Now, mind you, I am not suggesting that they should not, but I am not suggesting that they should. It is the process which I think could lead us to that suggestion.

I hope that is two minutes, Mr. Chairman.

Prof. M. Khare: Mr. Chairman, thank you very much, for inviting me to be one of the members of the expert panel.

The time is short so I just want to first make a point on what the Minister has said, which is very encouraging, regarding the area available for the aluminium smelter which is said to be about 1,500 acres where one-third would be used for the facilities and the rest of the area would be managed by the NEC, the communities and other people that

live in the surrounding area. This is quite encouraging. The remarks are facts which I got today from the Minister and this will be discussed during the visitations and during deliberations with community presenters who are here on how to use this area. This is one of the very significant points as far as the health safety and other environmental safety conditions are concerned. I hope that discussions would further enlighten on how to use this area as a buffer zone between the community and the smelter.

Thank you, very much.

Dr. R. Monteil: Thank you, Mr. Chairman, Hon. Minister. Let me say, at the outset, that my approach is a very simple one. It is an honour and privilege to be here. I have not had any discussion with any of the panelists and I am very honoured to be referred to as an expert. Let me say that my approach is very simple. I will make judgments on the basis of the facts that I hear. I have not gone through the presentations or anything at all so at this stage I am keeping, very much, an open mind and I will comment on facts as I hear them.

Thank you, very much.

Mr. G. Goddard: Good morning everyone. Good morning Minister Saith and the audience. I am representing a network of people at the EMA and other agencies that are participating in making a decision on the environmental issues related to the two smelters. We have applications before us and we are here to clarify the image role in this regard. We are here to bring light to areas where there is uncertainty with respect to our process and we are here to learn from the audience, the panelists and the speakers.

I am particularly pleased to have the opportunity to learn from the young people who are in the audience; I am very happy to see them here. I think they are the ones who would benefit from or pay for the start-up of any smelters in Trinidad and Tobago. I am very happy to have them in the audience and I think the South Trinidad Chamber of Industry and Commerce did an excellent job of getting together a limited amount of people but representing a very wide cross-section of the people involved.

Our participation here is part of an ongoing process of getting information and views. So far our process included visits to the smelters—two in China, one in Quebec and one in Brazil. Our process includes the significant public consultation on this process. Prof. Pantin spoke to this being the start. This is not the start for us as we have

been involved in this for several months now getting opinions from people in an unprecedented way. At the EMA we have really been reaching out, having one-hour interviews, bringing in experts from around the world to facilitate this process; having meetings with community groups, in particular, who we are particularly concerned about; the applicant, other experts et cetera. So, it is part of that ongoing process.

Another part of the ongoing process is inclusion of several other Government agencies and local and foreign experts in understanding issues related to smelters and understanding issues related to the environments in which smelters are being constructed. So, we are at various stages in the process.

We have an application from Alcoa for a smelter and the stage we are at is that we have given them instructions, their terms of reference, for how they should go about with developing an EIA. With the Alutrint smelter, we are at a more advanced stage. We have their EIA and we are going through several iterations of asking them for clarifications or showing things that are problems with the applications and getting those things worked out before we make a decision on that.

I look forward to the discussions and thank you, again, for inviting me.

Mr. F. Look Kin: Mr. Chairman, Dr. Saith, Minister of Energy.

The National Gas Company's role with regard to the aluminium industry is primarily one where the National Gas Company will provide transportation of natural gas from the offshore fields to the particular plants—really to the electricity plants that would convert natural gas into electricity for use by the aluminium smelters.

With regard to the actual gas itself, that is basically coming from a Government agreement with regard to royalty gas and then that gas would be used for the aluminium smelters.

I just want to mention that in regard to the NGC's role in the aluminium industry in Trinidad and Tobago.

Thank you, very much.

Dr. S. Smith: Mr. Chairman, Minister Saith, I, unfortunately, unlike my colleague, cannot keep too much of an open mind on this because I am here to deal with the health aspects of aluminium smelting. Health, from the perspective not only of the workforce

intended for the aluminium smelter but the health of the population or the health of the people in the environment of the smelter.

Now, health in that context, I must say, must have a holistic approach in the sense that health is the mental, the social, and the physical well-being of the individual in society. With that holistic approach many of the aspects of the health issues that I will pay particular attention to have nothing to do with the restoration or reversal of ill health, but the maintenance of health.

Many of us do not realize that our health and our enjoyment of life today have to do with what has happened in the environment. So, environmental health is of vital importance to everyone for the maintenance and protection of health and mental well-being. So, I would say that economic development is important, but economic growth cannot be the be- all and end-all. Development, after all, is about people and society. There are certain other inescapable goals that need to be pursued in the course of development such as environmental sustainability, human and social development, distribution of political power and the protection of basic human rights.

A noted laureate and artist has written a book, *Development as Freedom* and we have to embrace things like that if we are to develop. My resolution of this issue today will be based on responding to the comment made by Michael Simeon of the World Bank when he said that his wish was that the cost of development for some cannot be paid for in the coin of the impoverishment of the others.

Thank you.

Dr. V. Coombes: Mr. Chairman, Minister Saith, distinguished members of the panel, members of the audience, I have worked for the last 26 years, full time, in the industry as a Medical Doctor. I have seen some progress over that 26 years in terms of the approach we take in Trinidad and Tobago to issues of regional health, occupational safety, occupational hygiene and public health issues related to that.

When one looks at the establishment of an aluminium smelter it is undeniable that such an industry has hazards. It is undeniable that such an industry has risks. But, we have had many other industries in the country that have hazards and risks and we have managed them so far. So, my approach is to look at how best we can manage hazards, how best we can manage risks and ensure that in our approach to managing hazards and

risks we are in tune with the most up-to-date technology, the most advanced thinking in terms of what the so-called first world countries have done in terms of managing their hazards and managing their risks.

This is an opportunity as well for the country to expand its base of professionals. I have seen a plethora of activity taking place as far as safety training in the country. At least six different institutions are offering courses in safety. I have seen a number of institutions, also, offering courses in occupational hygiene and there would be lots of work for these people to do, not only in the context of aluminium smelting but in the context of industry in general.

We have many public health doctors in the country who, in my opinion, are relatively underutilized because their skills are not being tapped and this is yet another opportunity for public health doctors to develop a certain experience base in the context of monitoring the communities that they are in charge of from an occupational and an environmental health point of view.

My final comment is as it relates to Human Health Risk Assessment (HHRA). Human Health Risk Assessment for industries are often done by "world experts" and I would like to caution that in the local context that these Human Health Risk Assessments should have a local input in terms of participation because you need to have transfer of technology and transfer of skills as well. Sometimes experts use theoretical modellings when they are doing Human Health Risk Assessments. I would also like to caution against that because it is often better to use already existing plants with live data—online data—rather than rely solely on theoretical modelling.

Thank you, very much.

Mr. E. Keul: Mr. Chairman, ladies and gentlemen, I am privileged to be a part of this panel today. I come from a small energy-rich country with a very fragile environment, but we have had aluminium smelters for 98 years in our country. Today, we have seven smelters, among them, the largest in Europe. These aluminium smelters, today, are expanding. There have been some protests, but those were protests against old pot lines being closed down, not against expansions. The aluminium industry is also a very mature industry and there are proven technologies both for production and for environmental protection.

In my country most of the smelters are within small communities and are basically on the high street and there have been no proven adverse effects on humans in the vicinity of these smelters. Also, I can assure you that we have a healthy population. So, I am looking forward to the rest of today in order to assist with my speciality which is environmental control for aluminium smelters.

Mr. P. Saith: Thank you, Mr. Chairman.

Good morning Dr. Saith, ladies and gentlemen, distinguished members of the head table, delegates, members of the press and the public.

First of all, I would like to thank the South Chamber of Commerce for inviting me to join this distinguished panel. My role here today is to talk about the NEC's role in the development of industrial estates. I would talk about the site selection criteria we used and I am here to provide clarification on any issues regarding the site selection criteria.

I do hope that the symposium would answer some of the questions that some of us have in terms of the health and environment. As I say, I am here and you can contact me during or after the seminar.

Thank you.

Mr. Chairman: A very special thank you to each member of the panel for their enlightening comments.

Before we proceed to the technical presentations, permit me to draw your attention to certain procedural matters. To allow for a smooth, seamless flow of the day's events, and for maximum participation from the floor, we have some simple but important guidelines. Copies of these guidelines have been included in your information package which all delegates should have received. Please familiarize yourself with these guidelines as they are intended to ensure that everyone benefits from today's proceedings.

Also, all presentations will be made available to the public through the South Chamber's website. The website address is www.stcis.org and is included in the information package and was also published in the daily newspapers.

In addition, today's proceedings are being transcribed and will be made available also through the South Chamber's website.

On the issue of questions and comments, we will appreciate if questions or comments are addressed to the Chair. I will like to urge participants to adhere to these guidelines to ensure the smooth flow and encourage delegates to make their contributions.

Ladies and Gentlemen, now that we have introduced our expert panel and heard some of their views, let us proceed directly into our first technical session which will focus on the aluminium industry and national development. Leading off our presentations for this session is Mr. Colin Pratt who is a Management Consultant from the independent industry firm CRU Strategies in the United Kingdom.

Mr. Pratt graduated from the University of Manchester with a B.A. in Economics and from the University of London with a M.Sc. in Economics.

Until the end of 2002, Mr. Pratt was Director of the CRU Aluminium Business Unit and had overall responsibility for CRU's activities in aluminium. He has spent the last thirty (30) years working on commodity market analysis with the majority of those years at CRU where he led the Aluminium Business Unit from 1987 to 2002. During this period, he also built up CRUs aluminium research into a leading position as a source of information and advice to the industry.

I will now invite Mr. Pratt to present to us "An Overview of the Global Aluminium Industry". Mr. Pratt. *[Applause]*

Mr. Colin Pratt: Honourable Minister, Chairman, Ladies and Gentlemen, Good Morning. Thanks you very much to the South Chamber for giving me this opportunity to address this very important symposium. What I have been asked to do is to give you, as the title suggests, "An Overview of the Global Aluminium Industry". Now, CRU is an independent consulting company which specializes in the aluminium and other metals industries and we work for companies, governments, all kinds of national bodies and so on. We are an impartial, independent company and I hope to give an impartial overview of the industry. We have no particular axe to grind.

About two weeks ago, I was in Saudi Arabia attending a fairly similar forum as this and organized by the Eastern Chamber of Commerce in Dubai**.** Basically, it was a conference about how Saudi Arabia could continue to diversify its economy away from oil and gas in the direction of various energy-industries such as petrochemicals and

metals as well as downstream oil refining. It struck me how similar the situations were in many ways, and there was in fact a delegation from Trinidad; I do not know if any one of them is here today. I suppose that is probably the only way in which Saudi Arabia and Trinidad are similar. I am glad to say that I can get a cold beer in Trinidad without being arrested. I know it is raining, it was raining yesterday and it makes me feel very much at home but, strangely enough, the day that I was in Saudi Arabia it was also raining, believe it or not.

Just to give you some basic facts about the industry: To ask the question: why is the aluminium industry interested in Trinidad; why is it interested now; who is who in the industry and, finally, what is in it for Trinidad? I have pitched my remarks at a fairly basic level on the assumption that there will be many of you in the audience who do not know much about the industry so forgive me if I am going over some very familiar ground.

Okay, how big is the aluminium industry? As shown in this scale, it is the biggest of the non-ferrous metals industries. Aluminium consumption is currently about 34 million tonnes per year; about twice as much as copper; about four times as much as zinc; and about twenty times as much as nickel; so it is the biggest of the non-ferrous metals in volume. In terms of value, it is worth just over $80 billion a year in output at the primary stage and it is slightly less in value than copper. Usually when aluminium and copper prices are on a more normal relationship, the aluminium industry will be more valuable than the copper industry.

Now, to put this into context, if the two projects that we heard about in Trinidad were to go ahead they would account for about one per cent of world output and it will be worth about $900 million in today's prices.

Just to put into perspective, the aluminium industry is really dwarfed by the steel industry globally. The steel industry's output is about 30 times as much as the aluminium industry and its value is over ten times as much.

Where is aluminium consumed? Aluminium industrial countries consume about 75% of aluminium; that includes China, United States of America, European Union and Japan. Those four big industrial giants consume three-quarters of the world's aluminium. There has been a big shift in consumption in the last few years away from North America

and Europe and towards Asia, so China in a space of a decade has become the biggest consuming country of aluminium and many other commodities.

We are looking forward on this pie chart to about 20 or 30 years hence and we expect over that period of time that the world aluminium consumption will double just as it has doubled in the past twenty-five years but there will be a continuing redistribution of the consumption of aluminium so that in 2030 about 55% of the world's aluminium will be consumed in Asia and 35% in China alone. So, relatively speaking, the natural markets for Trinidad which will be North America and the European Union will shrink to just over a quarter of the world's consumption but absolute consumption in those areas will continue to grow so that market will continue to grow in absolute numbers.

What is aluminium used for? The first point I want to make is that the use of aluminium is very broadly based. This is a good thing because it means that the risk of aluminium being substituted by another material is minimal. It could be substituted in one application but gain ground in another application.

The biggest use of aluminium and one that is growing fastest is in transport. Aluminium is used in transport because of its lightness, it strength; and it is used often in order to improve fuel economi, in cars and other vehicles. So, as the world gets more conscious of the need to reduce CO2 emissions and the usage of petrol and oil, then aluminium should reap the benefits from that as it is light weighted; and it already has.

In transport an ordinary car will tend to use aluminium in the engine block, the cylinder head, in the wheels, in the radiator, in some of the suspension parts and sometimes also in the body panels. As you know, some vehicles are virtually entirely made from aluminium.

Packaging is the next biggest use of aluminium. Aluminium is used in cans, beverage cans and it is used in foil for households, foil used in pharmaceutical packaging, or in freight packaging generally. You can always tell aluminium beverage cans because they are very easy to crush. If you got a steel can, you cannot demonstrate your strength so easily. Packaging is a fairly mature use for aluminium. It is under threat particularly from plastics, PET bottles and so on but there is still a very significant use.

Construction is a very important application particularly with emerging economies such as China and India. Aluminium is used in construction in the form of

extrusions, in windows, doors, commercial fronts, and curtain rods sidings in office buildings. It is used in panels for cladding and roofing. It is also used in agricultural buildings; it is used in rod, furniture; it is used in light poles. It is used in a host of construction applications.

Electrical applications include cable: transmission cable, distribution cable and most likely this sort of cable will be produced downstream at the Alutrint's plant. Electrical applications are also fairly mature although there is, of course, rapid growth in emerging economies with their quickly expanding electrical transmission networks. The rest of the applications for aluminium are in a host of general engineering and consumer durable applications.

This next graph is the growth of aluminium in the last 55 years. I am sure it has been going through various periods of growth. In the 1950s and 1960s there was very rapid growth in the primary aluminium consumption spurred on by the post World War II economic recovery and also by the growth of new applications. Then from about 1972 to the early 1990s it went through a period of much slower growth and this was caused by several things; certainly, by the oil crises of the 1970s and 1980s which slowed down economic growth. It was also hit very much in the late 1980s by the collapse of the Soviet Union and the destruction of its economic base.

Now since the early 1990s we had a resumption of very fast growth in the industry and you can see there that the main explanation for this is China. The dark blue line on the chart or the area on the chart which you can see growing from nothing to very large proportion of world consumption there is the growth of Chinese consumption, particularly in the last 10 years.

I think the important message to take away from this, if you are looking at the global aluminium industry is China's growth is extremely important for the future health of the industry, as indeed is India's.

The implication of this very fast growth in consumption is that the world will need lots of new smelter capacity in the next twenty to twenty-five years. At the moment we think that there is enough capacity under construction being planned to satisfy the growth of consumption up to about 2009; but from 2010 onwards we estimate that in order to cope with that growth in demand, the world would need to build three of four

new smelters every year. When I say new smelters, I am talking about typical new AP35s, with Alcan pot-line which would be about 350,000 tonnes. So the world is going to need to build two or three of those every year just to meet the growth of demand. To put that into context, the smelters in Trinidad, if built, would satisfy about four months worth of world growth for aluminium.

Just for those who do not know much about the production process for aluminium, this is hopefully a very simple diagram. If you look at the left-hand side of that diagram you would see the primary aluminium production process, starting with bauxite which is the ore in aluminium, which is mined mostly in tropical countries like Brazil, Guinea in West Africa, Jamaica, Australia and India. In this region, of course there is bauxite in Jamaica, in Suriname, in Guyana and in Venezuela.

The bauxite tends to be processed, for logistical reasons, into alumina close to the mine because it does not make sense to transport three or four tonnes of bauxite long distances to be converted into alumina. So alumina refineries, which is the next stage of the production process, tend to be located in the same countries that produce the bauxite; therefore, in Jamaica, in Suriname, in Venezuela and so on. Alumina refineries produce something that looks like a very fine white powder. I have often been on plant tours in various alumina refineries and a lot of the time they very proudly present you with little packs containing samples of alumina and I used to manage to pitch those before I go through Customs actually.

The alumina is generally transported across the oceans to be smelted in a place where power is low-cost. So, there is not much integration between the production of alumina and the production of primary aluminium. The alumina is produced where the bauxite is; the primary aluminium is produced where the power is, and so, there is a big ocean trade in alumina. From primary aluminium we get semi-fabricated aluminium which comes in many different forms in terms of sheets, foils, extruded sections, wire rods and so on.

Where Trinidad will sit in this whole process is between the primary aluminium part and the semi-fabricated aluminium, the downstream aluminium part. I will not talk about the recycling but I will be very happy to talk about it, if anyone wishes, afterwards.

Moving on, why Trinidad? The first fact is that aluminium is a very power-intensive industry. We consume about 15,000 kilowatt hours to make a tonne of aluminium which is much bigger than any other metal. This means that the aluminium is a much bigger industry than any of these other industries on the chart.

Smelters try to locate anywhere in the world where they can find low-cost power– that is one thing – and energy-rich countries like Trinidad who use aluminium to convert powder into an exportable product. So until the advent of LNG if you had a lot of gas and you are isolated from a gas pipeline network, turning that energy into aluminium is one of the ways of monetizing the asset and making it internationally tradable.

This is a map which shows some of the most attractive locations for power-intensive industries which include aluminium. The important thing to note is that not only it has to be low-cost energy but there also has to be what economists call "low opportunity cost". In other words, it has to have very little alternative uses. As the Minister mentioned earlier on, in the early days a lot of associated gas was just flared for lack of alternative uses. If you have an isolated energy asset, turning it into aluminiun is one way of commercializing it. Another way is turning it into ammonia, urea or using it as feedstock for petrochemicals and so on.

We tend to say in CRU that the aluminium industry is always looking for power islands. Now, these power islands may not be literally islands - of course Trinidad is an island and so is Iceland – but they are figuratively isolated islands of energy such as Siberia, Southern Africa and the Middle East.

These power islands generally are based on three forms of energy: hydro electric for example, Iceland, Venezuela, Siberia; coal in Australia or South Africa; or gas in the Middle East and Trinidad. Because of this aluminium production will be added in countries that have access to low-cost energy. You see in the chart where they expect the capacity to be added in the next five years. You see places like Russia, Southern Africa, the Middle East, India, Latin America and at the same time the capacity to produce aluminium in North America and Europe is expected to go down as smelters shut down. One exception to this rule is there is a lot of aluminium capacity being built in China for very different reasons. One of the reasons is that China has very little capital cost and a very rapidly expanding domestic market.

A quick summary of why the aluminium industry is interested in Trinidad: availability of power at competitive cost. Trinidad is well placed to export to North America and Europe, both of which, we think, would have increasing import requirements. It is well placed to receive alumina supplies from Jamaica, Venezuela or Suriname and there is a stable business environment.

Why now? The answer to that one is reasonably simple. The aluminium industry, like many of the primary commodities, is going through a very strong price boom and, of course, like oil and gas as well. So the spike in prices that you see, the last spike on that chart, makes the investment for aluminium seem very attractive at the moment. Some analysts, some bankers particularly, will suggest that we are in the beginning of a protracted cycle in commodity prices that will last for several years; I tend to be a bit of a cynic on that one. I tend to think that this boom will collapse just like all the others have although I believe it will last longer than the others.

Anyone planning an aluminium project should not be planning on the basis of today's prices – I think that is probably a non-controversial statement – because in the long run, we would tend to find that the aluminium prices have reverted to a trend price - these days it is about $1700 or $1800 per tonne.

The spike in prices is one of the reasons why interest is hot now. I think the other general reason is that aluminium producers or companies are finding it much harder to locate power islands. The reason for that is the power islands are shrinking. The reasons for that are several; one is the regulation of the power industry which means that there are power markets, power prices become more transparent and it becomes much more difficult in those areas such as Europe and North America for a State-owned utility to charge power prices that are less than the market price. So that the regulation has tended to work against power-intensive industries in Europe and North America. There is the spread of gas pipeline networks, the spread of the LNG trade and a reduction in cost of transporting and producing LNG; all these tend to raise the opportunity cost of power. So, in other words, there are alternative uses of gas or other forms of energy that are pushing up the price of power to the aluminium industry.

Another factor, of course, is the concern over CO2 emissions and climate change. Say for example, if aluminium producers were to base their smelters on a source of power

that is intensive in CO2 emissions – and particularly I am thinking about coal in South Africa or brown coal in Australia which is probably the highest most intensive in CO2 - they are very concerned that in the long term they will get hit by some kind of carbon tax or emissions trading scheme. So there is a premium on low CO2 energy as well because gas is really in an intermediate position; it is much cleaner than coal in CO2 but of course it is not so clean as hydro electric which has zero CO2 emision. These are two main reasons why I think there is interest now.

Just to say a bit about who is who in the industry. Traditionally, the aluminium industry was like the oil industry. They used to say that the oil industry had seven sisters many years go, the big major oil companies. In the aluminium industry people used to refer to the "Big Six". In the 1950s and 1960s those "Big Six" dominated the aluminium industry and they were vertically integrated companies all the way from bauxite through alumina, through primary and sometimes even into finished products. I will not go through who those "Big Six" were because many of those names have gone into the history books; suffice it to say, there are only two left: Alcoa and Alcan, and only Alcoa still retains the structure of the traditional vertical integrated aluminium company.

At the same time, we have seen two major trends in terms of the structure of the industry; one is consolidation so where there was traditionally the "Big Six" in the Western World, they have now consolidated into two: Alcoa and Alcan. The whole was the Russian aluminium industry, which was broken up in the 1990s, has consolidated into one company Rusal-Sual, which only recently announced the merger. The bulk of the Chinese aluminium industry was consolidated to Chalco and so on. So this relentless trend of consolidation in the industry continues.

The second trend is for the vertical de-integration of the industry so the traditional integrated structure of the industry is breaking down. As I said, Alcoa is the only company that really stood with that traditional paradigm. Alcan broke itself up by splitting up its downstream operations into a company called "Navilis". Conjo Aluminium has not split itself up but operationally has made its upstream and downstream sections very separate, and I think that trend will also continue: the separation of the upstream from the downstream.

The third tend is the tendency for big mineral companies to be diversified across commodities so the biggest players in the aluminium industry in terms of the size of the companies, if not their production of aluminium, were Rio Tinto, BHP Billiton in what we called the old world and in the new world, the Brazilian company CVRD, the Indian company Venanta and CVG in Venezuela.

So the tendencies for these major mineral companies is to become diversified across commodities, whereas, traditionally, the big six aluminium companies were specifically just aluminium companies.

Now, if you look at it in that way, Alcoa and Sural, which are highlighted in red on these charts, are both in their own way swimming against that tide—although I should add, for very understandable and good reasons. Alcoa maintains that integrated framework and Sural—up to now, has been a downstream aluminium company producing wire rod and wire cable—now wishes to integrate backwards into a secure supply of primary aluminium. In this day and age, that is a fairly unusual thing, but as I said, I think they have very good reasons for doing that.

What is in it for Trinidad? I guess that is what most of you are here for, and, I think just want to give a very brief overview—there are many people here who are much more qualified to speak on the specific things.

We have heard of some of the positives, which I have mentioned before, monetizing energy for development; creating employment, primary and secondary; potential spin-offs in terms of services for the aluminium industry and downstream production; and economic diversification of the economy.

There could be more, but the negatives I can think of are largely environmental; SPL spent pot line; storage or disposal; emissions to air, which generally the main concern is aluminium fluoride emissions and CO2 emissions, or, as I mentioned, gases which are generally much better than coal in terms of CO2 emissions. The other source of CO2 emissions you have in aluminium smelters is the, I think they are called, per fluorocarbons (PFCs) which are very powerful greenhouse gases that get emitted from the cells. In modern smelters those are very effectively controlled by computerized process controls. Then, finally, land use by which I mean, of course, any displacement of people and implications for wildlife habitat or matters such as that.

I would just say one thing about the downstream because a lot of hope, I think, is pinned on downstream processing. One of the things that we have learnt over the years in CRU Strategies is that—this is one of the things that has driven the integration of the industry—the upstream sectors and the downstream sectors of aluminium are very different success drivers. Bauxite aluminium smelting success factors are access to resources, power or good bauxite deposits. In rolling, extruding and wire cable manufacture you are much more into customer-driven business or process-driven business.

One of the key things, I think, to take away from that is that having primary aluminium production does not automatically attract downstream business. Downstream businesses tend to want to locate close to their markets for logistical reasons and for the reasons of wanting to be close to their customers to have support lines to be able to deliver just in time and so forth.

That is not to say you cannot establish downstream businesses in a country like Trinidad or some of the other primary aluminium producing countries, but what I would say is that it does not naturally follow. In other words, you have to make an effort to make it happen—create the right conditions for it to happen—and there has to be a market for the output.

One of the big questions, as I mentioned earlier in this Saudi Arabian conference I went to was the extent to which the government in Saudi Arabia could, by developing infrastructure, regulations and certainty over laws and regulations and so on, could encourage the development of downstream industries—I think that is an open question at this minute.

Finally, in terms of trying to understand how the experience of having aluminium smelter has affected other countries, I noted a few countries where I think there is an interesting experience to be learnt from. In Mozambique I am aware that there was considerable emphasis on minimizing environmental impacts and encouraging spin-off and having a sustainable development focus. I think we may be hearing more about that later today.

In Bahrain in the Gulf, clearly again, there is now a big aluminium smelter there producing about 900,000 tons a year based on low cost gas. I think the lesson from

Bahrain is that Bahrain has managed to maximize downstream spin-offs and also the development of services related to the smelter. For example, I think that—I may be wrong and I may be correct on this—the pot shells for the new Alcoa smelter in Iceland are actually being constructed in Bahrain.

Dubai, also in the Gulf, also gas based with a large aluminium smelter. I think that is an interesting example because it is an example of a small country where industrial development coexists with tourism. In Dubai they have not focused very much on downstream activity.

Qatar has, I think, the world's second or third largest gas reserves after Russia. I cannot remember whether Russia is first and Qatar second or the other way around, but it has massive gas reserves and is pursuing, primarily, the LNG option in an effort to monetize that energy resource. It is also pursuing industrial development including a proposed aluminium smelter.

Norway, which we have already heard about, is a country with a small population, a sensitive environment and very large gas reserves. Norway has based its aluminium industry largely on hydroelectric power. The gas that was discovered in the North Sea in Norway has it highest value in the European market as pipeline gas. So, there is no particular reason to try to monetize it through feed stock.

Interesting, again, I heard at the Saudi conference, I think Norway, in a developmental aspect, when the oil industry took off in Norway in the 1970s and 1980s they did emphasize very heavily getting into the oil services business as a very important spin-off.

Just on that point, there are interesting lessons to be learned in the experiences of all these different countries, but there is no such thing as one size fits all. Clearly, it depends on the country. The reason why Dubai has not focused much on downstream development whereas Bahrain has, is that Dubai does not really have an employment problem. Already, I think, 70 per cent of the population of Dubai are expatriates, so they do not have an employment problem. Bahrain and Saudi Arabia on the other hand do have an employment problem. Qatar does not have an employment problem to speak of. Norway has large gas reserves, but the highest return use for that gas is simply to supply it to the European pipeline gas network.

I have been handed an envelope to say it is time and I am finished.

Thank you very much, ladies and gentlemen.

Mr. Chairman: Thank you, very much, Collin. I think you would agree with me that it is a very comprehensive overview of the industry.

What I propose to do is to go directly into the next presentation and then at the end of that presentation I would invite, maybe, a comment or two from members of the panel. The next speaker is Mr. Paul Lochner who would speak on the "Development Impact of the Aluminium Industry: a South African Experience".

Mr. Lochner commenced work at the Council for Scientific and Industrial Research (CSIR) in 1992, after completing degrees in Civil Engineering and a Masters in Environmental Science. As the market for environmental assessment work grew, his work focused on preparing Environmental Impact Assessments for large scale industrial developments and Environmental Management Plans, in particular for wetlands, estuaries and coastal developments.

In 2005 he was project leader for a Technology Review for the proposed Coega Aluminium Smelter, which provided an update of the EIA conducted in 2002 taking into account changes in the smelting technology to be utilized for that project. In 2004-2005 time period he was project manager for an Environmental and Social Impact Assessment (ESIA) conducted for a bauxite mine and alumina refinery in the Komi Republic in Russia. This ESIA was prepared in accordance with World Bank and EU policy, guidelines and standards.

It is with pleasure I invite Mr. Lochner to address us.

Mr. P. Lochner: Hon. Minister, Chairman, distinguished members of the panel, ladies and gentlemen, good morning. Certainly, it is a privilege to be with you participating in the symposium. I hope the experience which I am going to convey from South Africa in particular from my experience in Mozambique would be of interest and value to you as you face these decisions and questions which we are addressing today.

From what I have heard and from what I have already experienced from the discussions today, is that many of the challenges which we are facing in South Africa and in Southern Africa are quite similar to the development and socioeconomic challenges which are being faced here in Trinidad and Tobago.

As a quick overview of my presentation, I am firstly going to provide a brief background of the recent aluminium smelter developments that have taken place in South Africa and Mozambique. Then, I am going to give just a brief overview of the environmental and legal context in South Africa which then framed the way in which we looked at the socioeconomic impacts of aluminium smelters. Then, the gist of my presentation and the core of what I am going to communicate are the socioeconomic impacts of aluminium smelters. I am going to look at three examples: the environmental assessment which is done for the proposed smelter at Coega where the EIA process has been completed and approved by the authorities and secondly, to support or back that up with monitoring from two existing aluminium smelters, the Hillside Smelter in Richards Bay, South Africa and the other is called the Mozal Smelter in Mozambique near Maputo. Then out of that I would wrap up with some conclusions and recommendations around what are the main socioeconomic impacts of aluminium smelters in a developing country context.

To give you a quick overview there is map of South Africa and the southern part of Mozambique in the top right hand corner. Under that I have shown three of the main recent modern aluminium smelters in Southern Africa. There is, at Richards Bay, the Hillside Aluminium Smelter which commenced production in 1995. Just to put it in context, in the table there shows the production figures and tonnes of aluminium produced per year. It has started producing 680,000 tonnes per year after a third expansion.

Then, there is Mozal Smelter in Beluluane industrial development zone near Maputo in Mozambique which commenced production in 2001 and produced approximately 560,000 tonnes per annum. At the bottom there you would see the Eastern Cape Province, one of the provinces of South Africa, and there is a proposed Coega Aluminium Smelter near the town of Port Elizabeth. That is the example which I am going to focus on, primarily, in this presentation.

Another key point is that in South Africa—the previous speaker referred to it too—is one of the power islands and is featured on the diagram. Most of our power in South Africa is produced from coal—about 95 per cent of our power—by a national electricity company called Escom. So there are some similarities there in terms of the

national power company, but, certainly, the coal generation obviously raises different issues to gas generated power.

Another point of view is that we are importing all the raw materials for producing aluminium in South Africa and the majority of the products, in the form of ingots, is exported—at least 85 per cent is exported from South Africa and Mozambique.

Just to say a few words on providing context to the proposed Coega aluminium smelter near Port Elizabeth. A key point about this smelter is that it is aimed at promoting economic upliftment in the Eastern Cape province of South Africa which is one of our poorest provinces. The government has initiated a development programme where it has identified sites for industrial development zones. At Coega the government declared the first industrial development zone in South Africa as part of this recent initiative and a deep water port has been developed. The port was built in 2002—2005. A picture of Coega port is shown there in the slide and that is a visual simulation of the proposed smelter.

It is envisaged that the industrial development zone would host a range of industries from heavy industry to light industry and service industries. At this stage the smelter is seen to be an anchor tenant and a way of attracting other industries to the IDZ. Certainly, with the recent announcements of agreements between Alcan and the South African government to proceed with the smelter, it would present one of the largest post-apartheid foreign direct investments in South Africa. The value of the smelter project is approximately US $2 billion.

Another key point around the context in this Coega Industrial Development Zone is that a parastatal body—which is essentially a form of local authority or government authority—called the Coega Development Corporation, provides services to tenants wanting to establish in the Industrial Development Zone. That body serves as a one-stop-shop for providing services around labour and training as well as traditional local authority services such as water, transport services, roads and those aspects.

Briefly, just to look at the legal context in South Africa when we do Environmental Impact Assessments, and when we look at the socioeconomic impacts of project, we have to look at that within the context of our Constitution and, in particular , the Bill of Rights which grants:

"*Everyone the right-*

To an environment that is not harmful to their health or well-being…"

The second part I have quoted there is from the Bill of Rights where everyone has a right:

> "*To have the environment protected…through…measures that…secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development.*"

I think a key point from that is that there is strong emphasis on economic and social development happening at the same time and in parallel with the ecologically sustainable activities.

One of the differences in South Africa is the way we use the word "environment". We refer to environment as the surroundings in which humans exist. When we refer to environmental assessment of a project we are taking into account not just the affects of the project on the natural environment but also on the social and economic environment. An analogy shown in that picture of a cooking pot—the traditional way or preparing food in South Africa—in which you would put you food with hot coals under it. The analogy is for the pot to be stable it needs three legs and for a project to be sustainable it needs to be sustainable in terms of the natural environment, the social and economic environment. So, when we look at a project in an Environmental Impact Assessment process we take into account all those aspects. It is important that all those aspects of the project inform the decision-making that follows.

The last aspect I am going to look at around environmental assessment in South Africa, which is different, and also potentially has parallels here in Trinidad and Tobago, is that South Africa is demographically a very diverse country. When we engage in consultation with society around projects like aluminium smelters, we have to bear in mind that we have a very diverse level of literacy; we have several different official languages in South Africa; we have people with different ability to assess information and so we have to have a very broad-base consultation process and use a wide range of ways of engaging with people in communicating, discussing and understanding the issues and concerns around projects like this.

I am now going to move on to the core part of this presentation which is to provide feedback on what are the main socioeconomic impacts of aluminium smelter projects. The slide provides an outline of the scope I am going to be looking at:

- *Positive (benefits) and negative (costs) impacts*
- *Direct and indirect/secondary impacts*
- *Construction and operations phases*

As I mentioned earlier, I am going to base this, particularly on the studies done at Coega, near Port Elizabeth, and from the Hillside and Mozal Smelters.

One of the most obvious socio-economic benefits of the proposed Coega Aluminium Smelter will certainly be the direct employment opportunities. It is a smelter which involves two potlines and so the construction period is quite extended—it would be in the order of 60—70 months. The figures in the slide give an indication of the average jobs during construction would be 6,500 jobs during the peak of the construction process. What is important in a South African context is that there is a high number of unskilled or semi-skilled workers. So, it is important that the construction process be designed to maximize the employment opportunities for unskilled or semi-skilled workers.

During the operational life of the smelter, which is in the order of a minimum of 30—40 years, there would be an order of 1,000 full-time employees in the order of 200—300 subcontractors. So, firstly, one of the main socio-economic benefits is, of course, the direct employment.

I am going to look at the macro-economic aspects in a separate slide. Further positives of socio-economic impacts of a project such as Coega Aluminium Smelter, certainly, is focused around the employment of local labour from the city, close to the smelter. One of the main issues in South Africa is when there is development in a particular area people move into that area to seek work. So, it is important to place emphasis on employing local people in the area who are already accommodated, living and integrated into that community, and to try to minimize or avoid the effect of people moving into a particular area in search of jobs because of the additional social issues it creates.

So, one of the key benefits is to employ local people from the area and, certainly, it is one of the poorest areas of South Africa and in need of further employment opportunities.

A second key benefit is the skills, development and training that projects like this bring with them, both during the construction phase as well as during the operations phase.

Thirdly, this project provides a lot of opportunity for developing small, medium and micro enterprises. In South Africa the Small Medium and Micro Enterprises (SMME), as they are called, are seen as one of the ways in which unemployed people in the population are able to get into the employment process and there is a strong emphasis from government in South Africa in promoting small, medium and micro enterprises.

Fourthly, projects such as this, as we have seen at Hillside and Mozal, have corporate, social investment programmes and the Coega Aluminium Smelter has given some preliminary indications as to what that would involve and that creates a number of benefits. In further slides I will show some slides of what has followed from the corporate, social investments programmes at Mozal and at Hillside.

Lastly, one of the less tangible socio-economic benefits is to increase investor confidence in the Industrial Development Zone and also in the country. So, when the international world sees a company like Alcan investing in South Africa in this manner, with a substantial investment, it certainly promotes investor confidence in that Industrial Development Zone which is still getting off the ground as well as in the country.

There are also a number of negative socio-economic impacts which we have identified through the assessment process and which we seek to manage, minimize or avoid. The first one, as I mentioned before, is that in- migration of job-seekers to an area, in the hope of finding employment—particularly during the construction phase—on other projects such as this places pressure on the local services and infrastructure such as housing, health services and crime prevention. Those issues and concerns need to be managed and need involvement from both the proponent of the project as well as the local authorities.

The third point which also draws from experience of Mozal and Hillside is that the short-term nature of the construction contracts can create a number of problems for

the poorer people who are employed in those contracts which is particularly around debt management. People are on a contract for a year or two on the construction site, but they enter into longer term debt contracts with what is called the loan sharks—people offering finance in an informal sense. That presents a need for financial training and informing construction labourers of ways of managing their debt and what to avoid—in terms of taking loans with very high repayment interest rates.

Lastly, there is a concern in South Africa, which is a big issue—particularly during the construction phase which involves a number of people living in one area for a short period of time—is how that could potentially affect the increased spread of HIV/AIDS. That is particularly an issue if there is a high immigration of workers to the area.

These negative impacts are then looked at in detail in the environmental assessment process and we seek to find ways of avoiding or minimizing these impacts as best as possible.

The other component of the socio-economic impact is to look more broadly at the macro-economic impacts. By macro-economic I mean the wider economic impact of projects such as this on the national economy. Certainly, a project such as Coega Aluminium Smelter presents a significant contribution to economic growth at a national scale and, particularly, at the local scale.

I have presented how that is experienced in terms of direct employment creation, but that pie chart did not show us the indirect employment creation in the South African economy from this proposed Coega Aluminium Smelter. You can see that during construction it is predicted to create in the order of 30,000 to 51,000 wider jobs in the national economy, and during operations there is a prediction of between 9,000 and 15,000. Remember, from the previous slide, that is based on the full-time employment of about just over 1,000 employees.

That gives you an indication of the multiplier effects in the economy, but it is also important to look at the pie chart which shows that the majority of those wider jobs are in the electricity sector. Almost half of the jobs are created in the economy are in the generation of the power.

This other wider macro economic impacts and benefits include of course the Government's revenue from a project such as this. The Government receives substantial revenue from the companies involved as well as the income tax from employees as well as other forms of local government tax, value added tax, et cetera. There are also fair economic benefits for the wider economy through the catalytic role a project like this will play in the Coega industrial development.

The last point is a very complex economic issue; the potential for a project such as Coega Aluminium Smelter to affect South Africa's balance of payments, a simple analogy is the balance between the flow of money into the country and the flow of money out of the country and how that could potentially affect the exchange rate for an economy. This has been an issue in Mozambique with the Mozal Aluminium Smelter and this is an issue which we need to look at closely for the proposed Coega smelter. If there is some analysis of this particular effect, is that it would have a neutral effect in terms of the effect on the country's balance of payments. In other words, the flow of money into the country balances with the flow of money out of the country. A situation which we would want to avoid is if there is a flow of money out of the country which would have a negative impact on the exchange rate.

There are some macro economic benefits and there are also some macro economic concerns regarding the smelter and one of the main concerns is the relatively low level of job creation for the substantial investment, particularly during the operation phase. relative to other industries. A US$2 billion investment creating approximately 1000 permanent jobs; that is relatively low level of job creation compared to other opportunities. The question that is asked is: what is opportunity cost in terms of power utilization; is there a greater way of using power? The propensity to create more jobs is certainly a priority in South Africa.

Then the third point is the concerns around the externality costs which are not considered in environmental impact assessment such as this. There is a picture of a coal power station and particularly there are concerns around the CO2 emissions from the generation of power and to provide electricity for a project such as this.

I will look very briefly at what we have learnt from the smelters at Hillside in South Africa and the smelters in Mozambique. I will look briefly at what have been the main socio economic impacts of those two projects.

Firstly, at Hillside, one of the main benefits has been the economic growth that the smelter brought to the area through direct employment and wider job creation in South Africa.

Secondly, there has been a Corporate Social Investment Programme of approximately $1.5 million per year in 2004 and it is continuing and growing. That programme is focused on aspects such as education and development of schools in the area, and it has contributed to developing and improving facilities at a number of schools in the local area near the smelter.

It has also contributed to training and rural development. It has contributed to health, particularly around HIV Aids facilities and training and awareness. It also contributed to job creation through promoting SMME development and downstream use of aluminium.

Lastly, the Corporate Social Investment programme also affects agriculture in rural areas and assisting rural communities in being more self sustainable in terms of growing their own food.

The Mozal Smelter in Mozambique, shown there during the construction phase, also has a very involved and committed Corporate Social Investment Programme. It is applied through the Mozal Community Development Trust which commits approximately US$5 million per year to community development projects. The portfolio of community development projects include: infrastructure in the communities, education and training, health and environment and the health focuses a lot on HIV Aids issues, small business development in promoting small business and in supporting sports and culture development.

There are a couple of success stories from the Mozal Corporate Social Investment Programme through their involvement in health and supporting health services: Malaria in the local area around the smelter has been reduced from 80% to 8% occurrence.

The programme has contributed to local schools in constructing local schools and developing facilities. Also it runs a HIV Voluntary Confidential Counselling and Testing

Programme where 80% of the employees know their HIV status, which is a very high percentage by industry standards in Southern Africa.

Lastly, Mozambique has been struck by some very significant droughts and oscillation between droughts and floods over the last decade. In order to assist communities during the droughts period, Mozal has provided drought resistant seed and training around agro businesses. That assists the communities in being more self sufficient from a food point of view.

In closing, I have drawn together some recommendations around how does one enhance positive socio economic impacts from smelter projects. Two of the priorities in the South African context are to promote the use of local labour and to co-ordinate that as best as possible with the authorities in the local area so that there is continuity of employment from the construction phase through to the construction of other projects. In other words, avoid a situation where people are just employed for a short-term construction phase and then left unemployed after that. The important message is to try to provide a flow of employment opportunities.

In the example of Coega, the Coega Development Corporation which is the authority set up by the national government plays a crucial role in facilitating continuity of employment. They also stipulate in the contract agreements what percentage of local labour must be employed on the project.

The second key recommendation to enhance the benefits is to promote skills development and training. In the Hillside and the Mozal projects, scholars have been identified at the school-going age, who could be potentially employed in the operation of the smelter in years to come and scholars from the local community are trained up to work in the smelter projects and are provided bursaries and tertiary training.

What worked very well at Mozal was the concept of a job card where people employed during construction had the activities which they conducted during construction noted on their job cards and recorded and so it was known whether they can fix whatever or operate an angle grinder, whether they can drive a truck. That was recorded on their job card and they would use that to seek other employment opportunities when the construction phase for the Mozal smelter ended.

There are also recommendations which we can provide from our experiences in South Africa on how to avoid or reduce negative impacts. One of the key issues for us in South Africa was to downplay inflated job expectations and to have clear and accurate communication with the public, with the society around; the number of jobs being relatively low and in order to avoid a situation where there is an influx of people setting up informal settlements around the construction site in the hope of getting a construction job.

We have also had to develop in-depth programmes around AIDS awareness and education as well as treatment and managing progrmmes for AIDS. Thirdly, we have had to particularly during construction manage the informal trading which happens around the smelter sites. We have to be very clear as to what services are actually provided by the construction company on site and to designate where informal trading can take place. Linked to that is a point I mentioned earlier about assisting workers in understanding issues related to debts and debt management.

In conclusion, we see in Southern Africa, smelters play a valuable catalytic role for development and for economic growth in the area, particularly the local area around the smelters, although the job creation during the operations phase is relatively low. It is very important to maximize the benefits from the smelter projects as well as to reduce the negative impacts. So what is needed is much more than a risk management programme of reducing negative impacts but there needs to be a comprehensive programme around how the benefits are maximized and enhanced.

What we have seen from the example at Coega is that in order to truly maximize the benefits from a project like this, it is not something that is left only up to the company initiating the smelter project but it also requires a close collaboration and facilitation role by an authority body such as the Coega Development Corporation. Through this partnership or working together between the industry components and the authority and the wider community we have seen that a project such as this can provide a valuable contribution to economic growth in these areas. Thank you. *[Applause]*

Mr. Chairman: Thank you very much. We are running a bit late on time but maybe we can have time for two very brief comments from our panel. If anyone wishes to comment, please keep it brief and we will take a maximum of two before the break.

Dr. Steve Smith: What most speakers said, underscores the very issues that have plagued me as an individual and that have plagued the aluninium industry in terms of when they decide on a place to develop. They have gone to the poorest regions and what has evolved in terms of social fabric, the very things that the World Bank has warned against, such as joblessness, homelessness, marginalization, food insecurity, loss of common lands and resources, increased health risks, social disarticulation and with that will come the loss of civil and human rights and the disruption of formal educational activities. I think that one can lump all of this into something which the sociologist and the social anthropologist have called the "Resettlement Effect".

The Resettlement Effect has been encapsulated in the opening of one of the World Bank's operational policies, 4.12, and I will jut quote it for you:

> "The bank experience indicates that a voluntary resettlement under developmental projects if unmitigated often gives rise to severe economic social and environmental risks. Productive systems are dismantled. People face impoverishment when their productive assets or income sources are lost. People are relocated to environments where their productive skills may be less applicable and the competition for resources greater. Community institutions and social networks are weakened, peer groups are dispersed and cultural identity, traditional authority and the potential for mutual help are diminished or lost."

I think the last presenter underscores exactly those developmental effects and one wonders how one can justify monetizing through industry when this is the outcome in the social fabric. Clearly there is a threat to health because he admitted that the HIV AIDS incidence apparently has increased; so too would be crime in the region. Again I ask the question, in the words of Michael Cernea: Does development entail the creation of new poverty or are we meant to pay for development in the coin of the impoverishment of our neighbours? Thank you. *[Applause]*

Mr. Chairman: Dr. Khare.

Prof. Mukesh Khare: Mr. Lochner has very comprehensively explained various socio economic impacts of the development of the project. He tried to include all the parameters in the limited time but there are some issues which I would like to point out for further discussions. The basic issue is that because there is a triple bottom line

reference to the Peninsula of environmental, economic and social well losing business. There should be some balance among these three parameters and in today's climate people are really afraid of environmental concerns of such project so it makes sense to ensure that the environment is safe as far as the social impacts are concerned.

I would like to put this point for further discussion: how did you break or remove the psychological and physical boundary among the community who are living in that area between the land use for the smelter plant that is going to be constructed over there? This is a very important and basic factor which the community has to be convinced, the balancing between the land use and the land which has been used for the smelter. How did you remove this barrier, psychological as well as the physical? Thank you.

Mr. Chairman: Thank you very much, Dr. Khare. I just want to make one point. We are beginning to receive some questions from the delegates. All our speakers will be here during the course of the day so that in the interest of time I suggest that we address those questions during the discussion period later in the morning. At this time I would like to invite you to have a brief coffee break, 15 minutes and let us get back here promptly so that we can resume. Thank you very much.

Break: 11.27 a.m.

Resumed:11.50 a.m.

Mr. Chairman: Our next speaker is no stranger, he is one of the nation's leading agricultural and environmental advocates. I refer to none other than Prof. John Spence. Prof. Spence obtained his BSc and PhD degrees from the University of Bristol and Post Graduate Diplomas in Agricultural Science and in Tropical Agriculture from the University of Cambridge and the Imperial College of Tropical Agriculture.

He worked at UWI, St. Augustine from 1961 to 1997 as Lecturer, Professor of Botany; Dean of the Faculty of Agriculture and Head of the Cocoa Research Unit.

Prof. Spence has also served as an Independent Senator in our Senate and he is the recipient of the Chaconia Gold Medal.

I now invite Prof. Spence to speak to us on the subject, "To Smelt or not to Smelt". Prof. Spence. *[Applause]*

Prof. John Spence: Thank you, Mr. Chairman. Chairman of the South Chamber, members of the Head Table, Ladies and Gentleman, this presentation is being made by a

concerned citizen. I am not an economist although some of the things I will speak of have to do with the economy. I am not a doctor although I may mention health. It is to be hoped that the answers to the issues that I raise may help us in making decisions which are in the best interest of the citizens of this country.

The decision on whether to establish an aluminium smelter industry in this country, I believe, must be considered in the broadest sense, that is, the broadest terms. It should not only be a business decision as to whether the project is financially viable or in terms of employment opportunities to be provided or the revenues that may accrue to the national treasury.

The decision must be put into the context of our sustainable social and economic development. Indeed whereas until now heavy industrial development has been pursued without question, a stage has been reached at which we must take stock of the best use of our resources of land, oil and natural gas and human capital for the long term.

In the short term, we must also consider the best use of our skilled labour, management capability and the financial resources of the treasury. We need to make this assessment particularly in terms of whether we are building enterprises that will provide for sustainable development.

We must consider whether we are diversifying only within the energy sector or if we are building sectors of the economy that do not rely directly on either the natural gas or the foreign exchange that comes from the earnings of the petroleum sector.

In considering these issues of particular importance in our decision-making must be the fact that the country is comprised of two small islands. Now, small is a relative term. One of the previous speakers referred to Norway as a small country but it is very much bigger than Trinidad and Tobago.

There are three major issues we need to consider when we are discussing whether we should have a smelter or not. These are: health, environmental effects and social and economic development.

Personally I think the health effects have been over played to the detriment of our consideration of particularly the last, which is the social and economic effect.

The two smelters which are referred to as Alcoa and Alutrint have different configurations and so I will consider them separately. Firstly, the Alcoa Smelter: Health:

the health effects to be considered are: effects on persons living near to the smelter; effects on workers in the factories; the immediate effects as opposed to the long-term effects for both groups.

Literature would seem to suggest that in the past gaseous emissions from aluminium smelting factories posed a danger to nearby populations as well as to workers. The fear of the residents near to the proposed smelter is really, I think, created by this information on the industries in the past. The limited information that has been provided on this issue claims that new technology used in modern smelters keeps the emissions of noxious gases under control to the extent there is little danger to nearby populations.

Given the acknowledged dangers in the past there clearly needs to be an objective assessment by independent experts to allay the fears of the population. While this and other issues will be assessed by the Environmental Management Authority it is essential that other institutions give objective assessments of the issues. Among the local institutions that will be able to do this are the Government, through the Ministry of Health and perhaps the Ministry of Planning and Development, University of the West Indies and the University of Trinidad and Tobago. I believe that inter-disciplinary teams need to be assembled from these institutions so that there can be complete and objective assessments. So far, there has been complete silence from these institutions.

By contrast, I want to give a little story about the situation in Australia. In Australia, the Department of Health seems to take a direct interest in these sorts of matters. I will read an extract from a letter from the Department of Health in the Government of Western Australia to the Chairman of the Environmental Protection Agency in Australia on the issue of an expansion of Alcoa's refinery in that country.

"The Department of Health provides the following considered view:

> The Department of Health recognizes that there are economic advantages to the State of Western Australia, to Western Australia industry, employment within the State and to the community through the expansion of the Wagerup facility.
>
> The Department of Health recognizes that Alcoa has already addressed and improved the emissions control from the Wagerup facility over recent

years and that the proposed expansion would enable further state-of-the-art measures to be introduced.

The Department of Health notes that the current emissions from the Alcoa refinery meet the established national environmental protection measures and are well within these standards.

However, despite the economic benefits, the Department of Health has a number of concerns about the proposed expansion in the areas of the adequacy of the literature provided and the certainty of the protection of human health.

The role of the Director of Health in these settings is to attempt to quantify the extent of the likely health impacts and to allow the government to make decisions on the best available science."

How different in Trinidad and Tobago where there is complete silence from the Ministry of Health.

"Also in Australia the Healthwise Study (funded by Alcoa) being carried out at the Universities of Western Australia and Monash has indicated that while there is no evidence of immediate danger to workers in the aluminium plants that have been studied, the research is long term.

There is a recent report from the Group (not a scientific paper) and the following statements are reported to have been made: 'the results of the study were preliminary and the study is ongoing' and 'more detailed information from which stronger conclusions will be drawn will become available in the coming years. However, at this point, there seems little cause for alarm from any of the study's findings'

Now, this is extremely important because we are told that there are new technologies and we accept that they are better than the technologies used in the past. The fact is when it comes to an illness like cancer it is going to be many years before we know that even the low emissions from the new factories will in fact not have adverse effects.

The second health issue with respect to the Alcoa smelter is the fact that it is going to be built over an aquifer. Since the Alcoa Smelter is going to be built over an

aquifer which provides water to residents of that part of Trinidad, it is important that it be determined if there is any risk of contamination of the aquifer even in the course of normal operations of the smelter or if there is an accident. Of course, this may not be a compelling argument for not having a smelter at all since an alternative site can be approved for the construction of the smelter.

The question of the port: A port will have to be constructed for the importation of alumina and the export of aluminium and so any effects on the coast line will have to be carefully assessed. Unfortunately, the process for approval of the smelter is separate to that for the port. So approval could be given for the smelter but denied for the port. The process is clearly flawed.

Biological diversity: The clearing of 1,500 acres for the smelter and an equal area for the planned industrial park must undoubtedly have an adverse effect on the flora and fauna of the area.

Prof. Kenny has suggested that the Southwest Peninsula meets the specifications for being declared an ecologically sensitive area and this would probably rule out any further industrial development in that area. Prof. Kenny will speak to this when he addresses us this afternoon.

Hazardous Wastes: There is recognition that eventually pot-liners would have to be disposed of either in specified sites in this country or shipped abroad. Prof. Kenny will no doubt discuss fully the legal aspects and international complications of shipping hazardous wastes out of this country.

In addition there may be some practical difficulties. Will it be economic to ship pot-liners as soon as a particular batch is discarded in five years' time or will there be an accumulation of pot-liners and, if so, where are they to be stored to await shipment? If they cannot be shipped abroad at all, how can they be disposed of locally?

Dr. Ivan Chang Yen of the UWI Chemistry Department has done considerable work on hazardous wastes. He has pointed out that there are no designated sites in this country and our history of hazardous waste disposal leaves much to be desired. The most notorious case was the use of lead smelter wastes as landfill in Demerara Road, Wallerfield. Fifty children were hospitalized and one died.

Notes on the significance of introducing aluminium smelting prepared by Dr. Chang Yen are attached as an appendix to this paper and those of you who have copies would be able to read this.

We must not accept any proposal for disposal of pot-liners by shipping abroad which does not include binding agreements with third parties, that is, acceptance of such waste by other countries and agreements for passage through the seas of other countries where necessary. It is difficult to conceive how this can be achieved when the pot-liner wastes will not be generated for many years. How are we going to get the present Government of the United States to bind the Government for 10 years or the Government of Barbados when we have a big dispute with them on the flying fish, having to allow passage through their water?

How are we going to get the present government of the United States to bind the government 10 years hence that they must accept pot liner? Or, the government of Barbados, we are having a dispute with them at this time, about flying fish; that they will allow the flying fish through their waters. We must have binding agreements from these countries or we must have designated sites within this country.

Social and Economic Development – Economic Issues – Natural Gas: Perhaps the most critical issue is that of the supply of natural gas. Since the smelting process requires large quantities of energy, accounting for one-third of production costs for aluminium smelting, which in this country will be supplied by electricity produced by the use of natural gas, there is no doubt that the attraction for Alcoa to invest in smelting here is an assured supply of natural gas at appropriate cost. Since the selling price of the natural gas will not be revealed our economists must produce models which by assuming various selling prices for the natural gas will give an insight into the likely structure of the pricing. We cannot do more.

There are other aspects of the sale of gas to Alcoa which must be considered:

1. Whether we have a large enough supply of proven reserves to cater for the aluminium smelter requirements;
2. If we run out of gas will our agreement with Alcoa obligate us to import gas and subsidize the cost?
3. What are the opportunities lost by not using the gas in other way?

This was touched on by Mr. Pratt in an earlier presentation.

4. Or, the income lost by not selling it as LNG?

The citizens need to be informed on the arrangements for supply of natural gas to the government of this country. Is this being supplied in lieu of royalties? Is it that circumstance that is forcing us to use it for smelting? Can we spread the way in which it is supplied over a longer period by taking less now or will we lose it all if we do not use it up in large quantities for smelting? Transparency in how we receive our revenues is jut as important as how we spend them.

Diversification of the economy: The government's stated intention is to diversity the economy, but the Alcoa smelter does not appear to guarantee the development of downstream industries. Recently there have been statements from the government to the effect that no smelter would be approved if there are no such activities. Even if the agreement is made to develop such activities how can it be enforced? Will there be substantial financial penalties if it is broken? Will there be an agreement that a proportion of the production is to be so used locally? Ten per cent? Twenty-five per cent? Fifty per cent?

However, even if there are downstream activities once these depend on smelting with the use of substantial quantities of natural gas, diversification will only have been achieved within the energy-based sector and not away from that sector. Dr. Eric St. Cyr and other economists have repeatedly pointed to the necessity for us to develop what they have termed the "onshore" economy as opposed to the "offshore" economy, the latter being based on finite natural resources.

The argument as to whether the natural resources will last for 15 years or 50 years, to me, is a sterile once since it does not remove the inescapable fact that such resources will eventually be exhausted. At the age of 77 years, I tell people I started to work 50 years ago. Fifty years is like the blink of an eyelid and we must think not just for this generation, but our children and grandchildren.

Since natural resources cannot be considered the preserves of only the present generation at least a meaningful proportion of these resources must be used to develop sustainable "onshore" activities that will serve future generations when the oil and natural

gas are exhausted. Use of large quantities of natural gas for aluminium smelting must be viewed in this light.

Government sources have stated that the income from LNG would be greater, but the smelter would create more jobs. I ask the question: Can an equivalent number of jobs be created in alternative diversified activities which are sustainable in the long term? Some such possibilities will be discussed later in this presentation. Much is made of the economic benefits of smelting by way of employment generation, but since we now boast that we have full employment, are we, indeed, under this pressure to create so many more jobs by way of smelting?

The other benefits are said to be in the taxes to be paid. While I, in no way, question the good intentions of Alcoa, it must be recognized that the company has a major responsibility to maximize profits for its shareholders. That being the case, it may make good business sense for Alcoa to sell its products from the Trinidad operation to a subsidiary in another country with lower tax rates or perhaps where it could get a tax-free holiday and by pricing arrangements minimize its tax payments in Trinidad. Brazil's Federal Revenue department has levied a fine of some US$304 million against Alcoa's Brazilian subsidiary so there would seem to be, at least in that instance, a gap between the expectations of the Brazilian government and the Alcoa position with respect to tax payments. I do not know who is right, but, certainly, there is a difference of opinion.

Alternative economic development: There has been no comprehensive statement from the Ministry of Planning and Development on the plans for industrialization and, particularly, how the aluminium smelters fit into such plans. Have alternative development paths been considered for the south west peninsula? A statement from a senior government official suggests that it is planned that from La Brea to Icacos will be industrialized.

My view is that with the planned expansion at Point. Lisas—1,000 acres—and the development already started on the Union Estate, create a situation that it is now time to take stock and initiate a national discussion on how much further we want to go with heavy industrialization as opposed to the development of light manufacturing, information technology and other knowledge-based industries. Indeed, even if we get involved in the aluminium industry, since Senator Mary King has pointed out in a

personal communication to me, that "the challenge before us in Trinidad and Tobago is to make the local part of the industry knowledge-based where our competitive advantage is sustainable, i.e., it depends on our brains and continuous development of IP (Intellectual Property) and the resulting added value".

Some of our leaders and regretfully, some of our technocrats, seem to believe that the only form of development is industrialization with heavy industry. I regret to say that it is my assumption, or conclusion, that they have a 20th Century mindset and have not yet adjusted to the 21st Century. Recently, the Vice-President of India visited this country and one of our leaders stated that we could benefit from an association with India since that country was rapidly being industrialized. But, India is also developing Information Technology capabilities. Why do we not learn from the Indian about that experience instead of about industrialization?

In this small island, with limited land space, we need to preserve some areas of the country as green and serene as the people of the south west peninsula have been urging. Much of the land of the former Caroni (1975) Limited is going into built development and the green sugarcane fields will soon be a thing of the past.

I have suggested some possible developments for the south west that would retain a green environment and I believe that the people of that area have suggested other activities. My suggestions are a livestock industry based on the buffalyso, most of which already exist in that part of the country; and a nature park as a centre for local and foreign tourism.

I would spend a little time on this because I believe it is not enough for us to say we do not want smelting. We must suggest the alternatives and indicate how they might be developed. In the case of the livestock industry, the buffalypso, which is a local invention—it is a selection of the water buffalo made by Dr. Steve Bennett. The buffalo meat is good for our health as it is low in fat. The milk is used to produce mozzarella cheese used in pizza and which is a scarce commodity on the world market. Buffalo milk can also be used to produce butter, ghee, yogurt and butter milk. The yogurt fetches a high price in the United States. The hide can be used to process a distinctive leather and may be thick enough to be split to produce two types of leather.

Buffalypso are hardy, disease resistant, less susceptible to tick-borne infestation than imported cattle and so are less prone to diseases. They are resistant to internal parasites. Blood sucking bats do not attack them the way they do other cattle and they, indeed, can exist on very rough pastures. So, when we are told that the south west is not good for agriculture therefore put it into smelting, let us think about the buffalpyso.

Since this country is relatively free of diseases, particularly foot and mouth disease, an important export trade could be developed in live animals, frozen semen and embryos. Indeed, 16 countries in this region have bought calves of the buffalypso from Trinidad and Tobago.

Honey: High priced specialty products should be preferred such as honey as these could bring in a substantial income. In other words, we must go to match the sort of high income that we can get from the natural resources. The United Kingdom based *Bees for Development* who organize Beekeepers' Safaris to various parts of the world, ran a successful safari to Trinidad and Tobago in the year 2000. This was, in part, due to the fact than the honey from Trinidad and Tobago has achieved international respect. We have won awards at the National Honey Show in London, repeatedly, both from Trinidad and Tobago. Employment would also be generated in the activities that surround the industries, both the livestock industry and the honey industry.

With respect to tourism, a nature park could be developed for the south west which would display local plants and animals. Now, we are told that, perhaps, part of the Alcoa complex will be a nature park, but I do not think that we want a nature park that belongs to NEC or Alcoa. What we want is a facility—not necessarily in that part of the country where the smelter is proposed to be put down—in other parts of the southwest peninsula. Such a park would have educational value, attract visits from schools and serve as an additional conservation centre. There could be restaurants and bed and breakfast facilities provided by the local residents.

Apart from the nature park the beauty and relatively unspoiled nature of that part of the country makes it a natural for attracting tourists, both foreign and local.

No doubt, many other sustainable projects could be developed in the southwest peninsula based on the resources other than oil and natural gas. The expansion of agricultural production would complement the new thrust in food production as outlined

in the recent budget presentation. We are all concerned now about the cost of food, yet, we want to take agricultural land for industrialization. Conversely, the expansion of agricultural production would complement the new thrust in food production. Conversely, the loss of an additional 3,000 acres—1,500 for Alcoa and 1,500 for the rest of the industrial park—is not in accord with this thrust for agriculture and food production.

Social issues: With respect to social issues, we must consider the views of the people who live in the southwest peninsula. If it were judged that because of gas finds off the coast of Tobago the most advantageous place to develop an aluminium smelter was in Tobago, and the residents there objected, would we force the development on them? I think, not. So, the people of the southwest peninsula must not be treated any differently to the way we would treat the people in Tobago.

The independence of successful farming, or owning bed and breakfast establishments or small restaurants, as suggested earlier, seems to have no attraction for our planners. We have a disdain for agriculture which, I suppose, is rooted in our history, which we must, indeed, get rid of. Yet, the quality of life of such small entrepreneurs would be quite different to that of factory workers and the residents of the southwest must have the right to choose whether they want to be factory workers or whether they want to be independent farmers and small entrepreneurs.

Now, the Alcoa smelter, I believe, as I have said, is different to the Alutrint smelter so I would just spend a minute or two discussing the Alutrint smelter. The health and environmental issues will be the same because the emission problem will be there and the potliner problem will be there, but because the government owns 60 per cent of the shares in the Alutrint project the social and economic issues are somewhat different. First of all, the plant is smaller, therefore, it uses less gas. One of the issues we have discussed earlier was the use of the tremendous quantity of gas for smelting.

On the other hand we have been told little about the technology of the plant and this is to be used for the first time outside of China. I wonder, if the Alcoa plant required 1,000 acres of buffer zone, does Alutrint require the same? The assurances that we will demand of Alcoa must also be demanded of Alutrint and since a major share of it is to be

owned and financed, I take it, by the taxpayers of this country, transparency is a prerequisite for its development.

With respect to the social and economic development, since the Alutrint plant, as I have stated, is to be 60 per cent owned by the government, any concessions, such as a lower gas price given to the company, will be in part returned to the taxpayers. Further, it is proposed that all the production would be used in downstream enterprises ensuring some diversification, albeit, still within the offshore sector because it is dependent upon the smelting for the supply of aluminium. All this can be controlled by the government. Similarly, tax payments can be controlled so there should be no loss in that area.

However, apart from the fact that the Alutrint plant is smaller, all the other issues raised in the discussing the Alcoa smelter apply. Except, perhaps the one on land use because the site in La Brea has already been cleared, at Union, and I suppose there is nothing we can do about that. And, this is the point we ought to consider: whereas we can change our land use from agriculture to industry quite easily, once we build concrete that land never goes back to an agricultural or forestry use. It is a done deal for all times.

Now, I would just end with some discussion of the issues. Even if all the negative issues of smelting are satisfactorily answered the question is still valid: Why construct smelters in this country when we could import aluminium and go downstream from that product?

All the government officials who have spoken in support of the project have stressed the importance of manufacturing other products from the aluminium produced in smelting. It has been argued that this country should have a smelter because 49 other countries do. If there are 49 countries that do, then that means there are 150 countries do not. So, it seems to me that, statistically, we should be with those that do not. But, indeed, it has been stated that downstream manufacture will start with imported aluminium even before the smelters are constructed. That, we are told, is going to happen anyhow.

Japan has a large aluminium industry and that country imports two and a half million tons of aluminium and they have a very small smelting capacity of 6,000 tons. If the issue is the long-term supply of aluminium then we should form an association with our Caricom partner, Guyana. Why do we not think a little more broadly when we are

thinking about our economic development in the long term, especially? There are vast reserves of bauxite in Guyana. At the moment we cannot deal with Guyana at all because alumina is not produced in Guyana. So, we cannot import from Guyana, we have to import from Surinam or Jamaica.

Guyana is a vast country with a small population, unlike ours which is a small island with a relatively high population. Smelting will not present the problems to Guyana that we would have to face in this country. In addition, hydroelectric power could be developed in Guyana which would be sustainable long after our natural gas has been exhausted. In the spirit of the Caribbean Common Market and Economy a world class aluminium industry could be developed to rival that—I am being a little bold here—of the multinationals using Guyana bauxite and the financial resources that Trinidad and Tobago possesses. Conversion of bauxite to alumina and then smelting to aluminium could take place in Guyana where, no doubt, some downstream manufacture would also take place, but because we have invested in the development we could have an assured supply of aluminium from that source.

In the meanwhile—while we are waiting for those developments to take place—our entry into the aluminium industry by downstream activities could start with imported aluminium. The investment in the hydroelectric power in Guyana could also raise some other possibilities for the future, that is, an electric supply to Trinidad and Tobago from that source. I am not an engineer, but I always consult with my colleagues—my friends—when I am going to speak on matters outside of my area of competence; I speak to the economists about economic matters; to the doctors about health matters and the engineers about electricity—and I am told that it is quite possible to either have an underground cable from Guyana to this country or overland to Venezuela, now we are talking about grouping other countries in the region, not just in the Caricom—and then under water across the Gulf.

A leading economist has remarked that the inviting of Alcoa would seem to be a backward step to our colonial days when we produced raw materials for the metropole. We still do not know if we can force Alcoa to have downstream activities. Are our leaders constrained by colonial mentalities? Can they think outside the box?

My conclusion is that it has been suggested by a government official that this symposium is for us to persuade the government why the smelters should not be constructed. I view it differently. There has been enough objection voiced to the smelters and sufficient evidence from polls to indicate that the majority of citizens of this country are not in favour of the smelters. Therefore, it is at this symposium for the government to persuade the people of this country that they would benefit from having aluminium smelters and that the adverse effects are outweighed by the benefits. In this regard it is particularly disappointing to me that there are no presentations at this symposium from medical experts from the Ministry of Health, from planners of the Ministry of Planning and Development as I would have expected if government is trying to persuade us that this is the way we should go.

My conclusion is, under no way should we go with the Alcoa smelter. I can see no reason for using agricultural land for constructing a large smelter which would use large quantities of our natural gas, which we do not even know if we have in quantity reserved to supply, and, indeed, in a system where we have no control over what happens—either tax-wise, health-wise or in any other way.

With respect to Alutrint, I think, I need to be persuaded. It seems to me that we have more control over this process. If, indeed, we determine it is a health hazard we are the ones that can close it down. The taxpayers may lose in the deal, but at least we are able to do so. We certainly cannot close down the Alcoa plant once it has been built.

So, I accept that we should have an aluminium industry, I have no problem with that. I do not think that we should only industrialize. We were told, recently, by the Prime Minister that Dr. Eric Williams, our first Prime Minister, had three major activities for the country: one was the iron and steel, the other was aluminium, I have forgotten the third, but he also added that in Dr. William's time we did not have information technology; so that Dr. Williams would have added that to his portfolio of these three or four things that he wanted for the country.

Now my opinion is this: had Dr. Williams had the information technology, he may well have said that he would forego some of the industrial development because he could make up for it by what he could do by using our human resources rather than only using our natural resources.

Thank you, very much, indeed.

Mr. Chairman: Thank you very much, Prof. Spence. Just to mention that the South Chamber provides the forum for the widest possible views on the aluminium industry and this is what we are trying to encourage this morning. So, thank you, again.

In moving along, our next presenter is on the subject, *The Development Impact of the Aluminium Industry in Trinidad and Tobago*. This presentation was developed jointly by Mr. Gregory McGuire who is a lecturer in Energy Economics at the University of the West Indies and Dr. Roy McCree from the Sir Arthur Lewis Institute for Social and Economic Studies, also of UWI.

Gregory holds a B.Sc in Economics and an M.Sc. in Petroleum Economics from the University of the West Indies and has done extensive postgraduate training at Oxford College of Petroleum Studies, the MW Kellogg Graduate School of Management and the International Law Institute. He has written extensively on energy policy, strategic planning, technology transfer and economic development.

Dr Roy McCree, also of the University of the West Indies has a Ph.D in Sociology from the University of Leicester. He also holds B.Sc and M.Sc degrees in Sociology from the University of the West Indies. Dr. McCree has also written extensively on the social impact of industrialization and development in the South West Peninsula. His research into this area include, in 1999, *The Impact of Atlantic LNG on the Quality of Life in Point Fortin 1996—1999*, and in 2002 *The Potential Impact of Industrial Expansion in the South Western Trinidad with Particular Focus on La Brea 2005 (July)* also, in 2005, *The Potential Socio-Economic Impact of Highway Expansion in Southern Trinidad.* Dr. McCree, in fact, was born in the Borough of Point Fortin, so he is a Southerner.

It is with pleasure, I give you, Mr. Gregory McGuire and Dr. Roy McCree.

Dr. R. McCree: Good morning, ladies and gentlemen.

We live in a curious world and it becomes more curious with each passing day. I say curious for two main reasons: firstly, our meeting here today should have been held months ago, long before any proposed smelter, long before any opposition to the smelter and, it should have taken place in the context of the present dominant concerns about good governance, transparency and partnership approach to development and public

policy. Secondly, I also say curious because we have had an oil industry in Trinidad—in the South, in particular, for around 100 years and I am not aware we ever had a symposium to discuss its impact on the communities, either during the period of boom or the period of bust.

However, because of what has transpired concerning the present development and investment initiatives, we have been forced to engage each other in dealing with the impact of the proposed aluminium smelter.

Nevertheless, in spite of the lateness, I welcome the opportunity and the initiative to hold this symposium. We are supposed to address the issue of development impact, and when I speak of development impact my main focus will be on issues relating to health, housing, education, poverty, sport and leisure. And, when I speak of impact, there are two types of impacts I want to distinguish: potential impact and actual impact. Additionally, in assessing development impact I think we should have clear what we mean by development. Development, to me, is a process that ought to be transformative, which involves improving our standard of living and altering or changing particular relations of power, dependence and modes of thinking so as to achieve self-empowerment and progress.

In order to get some sense or gauge of the potential social development impact of an aluminium industry or any major industry in southern Trinidad, I think it important and fundamental that we take cognizance of four major related issues. These relate to examining the historical experience of these communities with the oil industry and the associated benefits, legacies and contradictions that we have experienced in that process; we also need to take cognizance of the contemporary socio-economic conditions faced by these communities; thirdly, we need to look at the recent experience with the Atlantic LNG Plant; and, fourthly, we also need to examine the urgency to revitalize and develop communities in the area.

I think it important that the whole question of the potential impact of the proposed investment be placed in historical perspective in order to, on one hand, educate the foreigners among us—those who live outside of these communities—as well as the younger generation who know absolutely nothing about the past or present of these

communities to be affected and the historical role of heavy industry in, what you may say, our construction and creation of communities.

So this is why I just want to share with you some basic data on the people and community we are talking about. La Brea has a population of just over 19,000 Borough of Point Fortin, 18,000; Cap de Ville, which is inserted in Point Fortin, 4,533, and Chatham 1,517. For the person outside we tend to be viewed as one homogenous amorphous mass of people and the reality on the ground is that there are differences. There are differences in size. There are differences in the distribution of ethnic groups: some areas are more African dominant than others; in others there is a greater dominance of people of Indian descent.

We also have, critically, differences in the type of experience with the oil industry historically; Point Fortin and La Brea, in particular, having more experience with heavy industries than, say, Chatham. So the reason is not homogenous, there are subtle and important differences that exist that we need to be mindful of, and we need to be aware of these differences; and we need to be aware of the lessons that come out of past and present industrial expansion in order to possibly chart the way forward, in order to assess the possible impact of what is proposed.

Now, historically, after plantation slavery and the era of agriculture it was through the oil industry that the communities along the Southwestern Peninsula were developed. Some of the more notable oil companies included Trinidad Leaseholds Limited, United British Oilfields, Shell Oil Company and Tesoro Oil Company.

The oil companies' impact was felt in four major areas. You had health: you had, for instance, the Augustus Long Hospital in Pointe-a-Pierre. You had the Point Fortin Hospital, formally the Shell Hospital. You had housing benefits. For instance, you had working-class housing being created in Techier Village, Point Fortin. You had the more middle- and upper-class housing being created in Clifton Hill in Point Fortin, in Crest Camp in Fyzabad and Brighton in La Brea. Some households had free gas and water in Point Fortin at one time, it no longer exist. You had education and training. You had the companies apprentice schemes existing. You had sport and leisure infrastructure being created. You had golf courses in La Brea and Point Fortin. You had lawn tennis courts, swimming pools, basketball courts. You had staff clubs being created with various types

of activities taking place in there. You had various football stadia being constructed by these companies and you also had the financing and organizing of developments.

We need to recognize that some of these developments in housing and health came out of the 1930s labour revolt which had significant implications for our development politically, socially and otherwise so it did not happen because of the philanthropic motivation of some of the oil companies.

In addition oil companies also recognized earlier on that a worker who is healthy and a worker who is fit would produce more and that worker is easier and better to exploit. In addition, the facilities were also conducive to good company and community relations for their mutual development.

However, that was the past. For some of us it was seen as a sort of golden era of social development in the South Western Peninsula with these facilities being created and constructed, but there was a period of bust and decline from the 1980s to the 1990s. What were some of the expressions of this decline? You had the closure of some of the Oil Refinery in Point Fortin. You had the closure of the Dunlop Tyre Company in Point Fortin. You had the closure of the bank in La Brea. You had the rise of Gun Hill in Point Fortin. You had the depreciation and destruction of sporting infrastructure: in golf, swimming, sport grounds and staff clubs. They have gone through tremendous decay and depreciation over the years and during this period.

What that means? The moral of that decline story is that long before the issue of smelters was being considered, we were going through a melt down with our social development and the type of gains we had achieved coming out of the 1940s, 1950s and 1960s. So it is symbolically ironic that we have a smelter plant that is being proposed to get us out of that melt down in a particular way.

It was also during the period of decline in the mid 1980s early 1990s that you had poverty on the rise in Point Fortin; it reached 36%, just around the national average. In Rancho Quemado, it was 43%. You also had unemployment in Point Fortin reaching high levels. In 1988, at the height of the adjustment, it was 32.3% compared to 22.2%. It has been declining within recent times but historically, Point Fortin, an area characterized by heavy investments, has also been characterized by high levels of unemployment and poverty.

There were some contradictions in our experience with oil production: high levels of unemployment; high levels of poverty; the worst roads in the country in spite of the presence of a Pitch Lake. You had what we refer to as the development or underdevelopment.

So the experience with oil production has been a rather mixed one. There are lessons to be learnt also from the Atlantic LNG Plant that has existed for some time now in Point Fortin. Some of the benefits have included the following: the return of investor confidence in the local community or economy; a boost to the retail and fast food restaurants sector through the establishment of fast food outlets; the establishment of a technology centre which offers vocational-type training to youths in the region; the elimination of criminal elements in what was called "Gun Hill" and the return of some semblance of hope and social stability in the community – one of the greatest benefits coming out of that process.

I did say that unemployment has been decreasing in Point Fortin over the last few years. You have a graph and you can see the blue curb is persons with jobs and the other curb is unemployed people, so they are going in opposite direction. So unemployment has been declining in Point Fortin over the last few years but there is a particular feature of that employment and we want to look at it. Agriculture in Point Fortin accounts for 1.2% of those employed; petroleum and gas 17.7%; other manufacturing 5%; construction 18.9% and services 33.1%.

I have looked and tried to ascertain where the jobs are created and there are two main areas: construction and the service sector. When you disaggregate the service sector, you would get something called "personal services" and "community services". In the personal services and the community services you would get the CEPEP-type jobs and the like. So the employment that has been created has tended to be of a low status, low paying nature in Point Fortin coming out of the presence of Atlantic LNG.

In light of this you have mixed outcomes and consequences with an approach that is based on heavy industry which is an approach being undertaken now. I am saying because of the limitations of that approach, particularly the labour-absorptive limitations, we need to adopt a different type of model to transforming our society, to transforming our communities.

I think the mixed model approach is the one that is ideal and that mixed model approach involves four major elements: Industries; those are mineral extraction, agriculture: farming, fishing, manufacturing; small business and popular culture, and I refer to popular events that take place annually: in Central, the Sugar and Energy Festival, Borough Day Celebrations in Point Fortin. Now, this mixed model is not airy-fairy or a dream, I think elements of it already exist and I refer to the central region in particular where the construction of the Point Lisas Industrial Estate has been easily accommodated alongside agriculture and farming that continues to form a part of that community. The viability of this mixed model which has existed in Central for some time can be seen in the fact that Caroni had the lowest unemployment rates in the country. I refer to 2004. The Borough of Chaguanas, unemployment rate of 3.1%, Caroni 7.3%; the national rate was 8.3%.

The mixed model offers, to me, a lot more positive options and consequences for the development of our communities and I am wary of the explicit focus on aluminium smelter as a heavy industry approach to economic and social development.

By way of contrast, before I give that contrast, let me show the power of the mixed approach: in Caroni, unemployment in the sugar sector moved from 5,600 in the 1990s to 300 in 2005. The unemployment figure moved from 7.2% to 7.3%. Where did all these people go? They migrated? They moved to a next community? They were absorbed in agricultural activities that they are still engaged in. They were absorbed in small business activities that they are still engaged in. I think that is a significant example and lesson to be learnt from the Central experience and actually taken into consideration as we approach this investment that we are undertaking.

I want to touch on the potential impact of industrialization in the Southern Peninsula. I think there are benefits and I want to direct attention to some of them. You have the possibility for consolidating or expanding the existing provision of vocational education in the area. There is the potential – I say potential - I talked about the impact, there are actual and potential impacts; the possibility that it may avert or prevent the closure of the Chatham Youth Camp which represents a source of vocational skills in the community. I understand that it has been down on the chopping block to be dismantled by the Government.

The new plant and investment can possibly strengthen the call for upgrading the lone hospital in the region, the Point Fortin Hospital to cater for industrial accidents in particular and the general well-being of the community.

The investment can strengthen the need for the creation of better road network in the region and the long promised highway to Port of Spain, which over the years was seen more like a highway to Heaven.

I see potential benefits in the area of small business. This has been one of the effects of the Atlantic LNG experience. The owner found workers increasing by up to 25%, 30% and 40% in the community; and that is a definite area you can have potential benefits and threats. You also have increased source of funding for sport and cultural development as a potential effect and a most important and critical effect has to do with community renewal or revitalization.

Lastly, having attempted to explore some of the benefits of possible industrial expansion as well as the negative side, the contradictions, you know: high unemployment, high poverty levels, bad roads, I think the way forward has a particular requirement. The industrialization or the opposition to the construction of the smelter plants has raised some very serious questions about the aim and approach to public policy, social economic development and the role of the State, business groups and civil society in this process. The questions that we have to confront include: how do we develop and transform our communities, particularly rural communities, and so improve the quality of life? How do we industrialize or should be industrialize? How do we modernize or should we modernize? How do we approach the exploitation of our natural and human resources in ways that are sensitive to various social, cultural, political, environmental needs and concerns?

I recognize the concerns raised by the anti smelter or environmental lobby and I would like to suggest that what these communities need, however, is a kind of grouping made up of professionals, community leaders and the like who have an interest in not just issues of the environment but in other social issues that plague these communities: in housing, health, education, roads, transport, culture and sport.

That body would be a sort of watchdog, a sort of monitor to help deal with issues that arise in the process of industrial development. For instance, I refer to a particular

situation where the bosses of the Atlantic LNG plant live in Port of Spain. The headquarters is always in Town and they visit the country on field trips and field visits. So the potential for impacting the value of real estate and housing is stymied, is undermined, in that type of practice or policy.

If that is where the aluminium smelter plant is going, I think it is undermining its own utility in the community and a watchdog agency needs to engage these types of issues. So as it is presently constituted, the anti smelter lobby is, to me, is too narrowly focused. We cannot dismiss the issue of the environment which should be part of the process of development but because of the background, the origins of some of the leaders of the community I do not see a concern being expressed about some of the issues that have been raised, about some of the experiences that the communities have had to engage and deal with coming out of the oil industry experience, Atlantic LNG experience.

We need a proper grouping to be part of the process of transforming these communities and the narrow focus on the environment while important and critical, to me is not enough because I fear that depending on whoever wins, they may fold up and go back to Port of Spain where some of them live and the other problems of poverty, health and education are gong to be left for somebody else to see about. We need a big lobby; we need a multi disciplined lobby, one that transcends a set of cleavages if we are to deal with the issues that are coming out of industrial development not now but historically otherwise I think we are just fighting an Iraq-type war.

Mr. Chairman: Thank you very much, Dr. McCree. We have got two presentations from this team. I will invite our second speaker, Mr. Mc Guire, to treat it briefly.

Mr. Gregory McGuire: Thank you very much. I will try my best to be very brief. Salutations to everybody here and thanks to the South Chamber for inviting me. I think the occasion is special for two reasons; one of which is in my time it is the first time I have seen a government responding to vocal and valid protest in the way we have done here today.

Secondly, this is the first open discussion on the natural gas-based industrialization process since the inaugural conference on the best use of our natural gas resources which was held way back in 1974.

I want to address the question of how can aluminium smelters enhance our economic development, prosperity and sustainability. I would have liked to speak about the history of this but I think Dr. Saith talked about that in some detail this morning, so let me jump straight into the question as to why Trinidad and Tobago, why do aluminium companies now view Trinidad and Tobago as a location. The answer is obvious: competitive gas price, competitive energy cost or, to put it bluntly, cheap gas. It is because electric power is the single most important cost factor in the production of aluminium which represents 35% of the operating cost and most of the primary aluminium facilities across the world are located in places where there is inexpensive energy.

Although our prices in Trinidad are by far the lowest in the region, it is understood that a fifty per cent reduction is necessary to make an aluminium plant viable in today's market conditions. The current cost of industrial power in Trinidad and Tobago is about US four cents per kilowatt hour – I am subjected to correction – and it is my understanding that at one time the aluminium investors were asking for US1.5 cents per kilowatt hour as the price at which to do it.. To do that, you need to do two things; one of course is to have cheap gas; and, secondly, combined cycle gas turbines in order to reduce the cost. I heard someone say earlier that there is so much gas being used. The two smelters, I understand, would use the same amount of gas because of combined cycle technology.

The salient point that I want to make is that the current levels of electricity price that we seek in our industrial firms here are insufficient or too high to attract a smelter. So if today we are talking about one, two and then a couple weeks ago announcement of a third smelter, it means that there has been a dramatic shift and certainly what is an offer on the table in terms of gas price has to be substantially lower than what is afforded to our producers here. If that is the case, then what does aluminium promise us? Historically, the entire Point Lisas experience has been increase in investment output, government revenue, employment and export earnings and indeed the aluminium smelters are simply the extension of the Point Lisas model with the input of foreign capital.

What we can glean from the public information that we have, and we heard it from the Minister this morning, it represents two things; one is a diversification of the gas portfolio. We keep hearing about alternative uses of gas and I think it is my responsibility to let people here know that Trinidad and Tobago has perhaps the most diversified gas business across the globe. There are not many countries that would have taken on the entire gamut of production possibilities of gas in the way that we have.

Secondly, there is tremendous potential for deepening the industrial base. We have heard a lot about that this morning. Aluminium products feature in aerospace, automotive packaging, building and construction, transportation, power distribution, industrial market, et cetera. What that means is that a myriad of opportunities exist and downstream expansion would arise as a result of that.

Here is a situation where we are juxtaposed. A sacrifice has been made in terms of gas and power costs in order to get these benefits, a trade-off is taking place. In short, the question that we face is: Does the stream of economic benefits compensate Trinidad and Tobago adequately for the revenue foregone in lower gas and electricity costs? That is the essential question that we face. The gas market consultants estimated that Government would have had to forego some US$500 million over the life of the project in order to secure the Norsk Hydro project. That is in the Gas Market Plan Report.

We understand, from my calculation, that the two smelters may require about 200 to 220 million standard cubic feet of gas per day, which is another misconception about the project, that why are we putting gas to smelter and why do we not do LNG? Well, the last LNG train took 800 million standard cubic feet of gas per day. Someone's argument against the smelter is that it is utilizing too much gas and I say that we should all line up and protest against more LNG – I will join you by the way.

So in the trade-off that seems necessary to win an aluminium project, careful consideration needs to be given to the potential benefits. I have worked out that 200 million per day, if we assume that the cost of gas or the subsidy on the gas is about US50 cents, it means that the Government will give up about $1.2 billion over the entire project life in revenue foregone, and that will create about 2,000 jobs, we heard from the numbers this morning. That works out to about $400,000 per job over the project life. How many persons work for $400,000 over a 10- or 15-year period? I do not know.

The question we therefore face is: what do we need to look at if we are to measure whether or not this trade-off is adequate or is sufficient and there is something that we are prepared to go with? I suggest that we simply cannot continue as if the world has not changed. We cannot simply continue to look at changes in output, changes in employment and changes in perhaps Government revenue. We need a list of criteria and we need to modify those criteria. I suggest three or four that I want to touch on. One is that instead of simply looking at output, we now need to look at net value added, that is the amount of value accumulated across the value chain. That value chain has to extend from primary production into secondary and tertiary production for it to make sense.

After thirty years, Point Lisas is only now beginning to move into downstream processing – thanks to our Chairman here. LNG, we must recognize, is no more than a primary processing plant; indeed it is a refrigerator. In the specific case of aluminium, it is imperative that the country seeks to maximize its downstream potential and maximize its interface with the national economy. That means assisting local entrepreneurs to get involved in capturing the downstream opportunities. It also means increasing local value added through local equity ownership. It means participation of the local financing and insurance institutions. It means all of those things in order to capture greater value.

The second criterion has to deal with, not only creating employment, it cannot be simply employment, it has to be developing local technological capabilities. Transnational corporations in extractive industries are particularly notorious for providing the workforce with only working and maintenance skills. In the classic T&T subsidiary most, if not all, strategic decisions are made in head office. We heard that Alcoa, in particular, guard jealously its vertically integrated nature and therefore it behaves in a way similar to the old transnational corporations.

The result of that is that locals never get to learn the tricks of the trade. In fact, a recent study by LouAnn Barclay suggests that the foreign investors—and she observed the local energy sector—had played virtually no role in enhancing the country's indigenous technological capabilities. When we use the term "technological capabilities" we are talking about the ability to take that industry and have the skills to run the industry on our own to compete in the world out there. We do not learn those skills.

So, that is what we need to look for from any aluminium smelter. We need to ask ourselves the questions: Are we getting this? Are we pursuing this in any way?

The third criteria I want to touch on—there are more—is the question of export earnings in time. Aluminium definitely will add to our export base and increase its size, but there is certainly going to be no reduction in price volatility. Aluminium prices have fluctuated between $1,000 a tonne and $2,600 per tonne over the last 10 years. That is a huge volatility. Of interest, therefore, to the citizens would be the prices that have been used in making projections of planned revenue, foreign exchange earnings and government revenue. These things need to be answered. What is the view we are been taking of long-term aluminium prices? Is it $1,600? Is it $1,800? Is it $2,600, which will make all the numbers look nice?

Again, in terms of investment, if you are in a cyclical and highly volatile industry, then having downstream plants within the country helps to hedge against that volatility in commodity prices.

I just want to close with two important fallacies in energy sector investment that I think we need to put on the table. The first is this question of employment. I think over the last 10 years over $15 billion have been invested in the energy sector,—Point Fortin and Point Lisas—yet, that sector still employs under four per cent of the workforce; that is direct employment. It is only about 22,00 people, privileged people, who are employed in that sector.

The fact is that energy sector expansion will not, to my mind, provide much needed quality jobs in the amounts necessary to create the type of society we want. What is true of the national community is also true of the southwestern peninsula. Energy sector growth is not a panacea for the relatively high unemployment that we have had in that area. The other thing is that when those plants were there, you would find that the workers who take up the top jobs are typically not from the area. That has been the experience in Point Lisas. The people who drove in and out of the estate everyday, up to today, do not live there, they live somewhere else, as is the case with Atlantic LNG, and will be the case with Alcoa and all these smelters. So, we need to be conscious of that so we could correct it.

The second myth, in my mind, that seems to be pervading is what I call the myth of "the more the merrier". It would seem to me that we have taken the Atlantic model and we are approaching the aluminium industry in the same way. So, in quick time we have built four Atlantic LNG Plants, we have moved from zero to hero where the Atlantic project is concerned. We seem to want to do the same with aluminium. The industries are fundamentally different.

With LNG we were in the growth cycle of the LNG trade. The energy trade is only now beginning to expand. There are all kinds of drivers that caused that to happen. With respect to aluminium we heard some of the experts here this morning describe it as a mature industry. In a mature industry, when your only competitive advantage is, in fact, low cost, that could easily be swiped from under your feet. You could lose that competitive advantage very quickly as new low cost locations come on board.

Therefore, I would imagine that we need to be cautious here. I would imagine that we need to wait to see what is on the table; to see if all this promise of aluminium is, in fact, going to pan out. Indeed, when we started with steel there was a big promise that we were going to go downstream with steel and had all of that. Did the steel promise work out? Caution is advised.

To summarize I am really arguing that from an economic standpoint the development of an aluminium industry in Trinidad and Tobago has opportunity cost in the form of revenue foregone, with respect to the pricing of power and natural gas, in that context a smelter seems attractive and advisable to Trinidad and Tobago only if it meets its prescribed targets for increased value added, increased economic rents and improved technological capabilities.

The sum of these benefits should outweigh the revenue foregone or the opportunity cost of alternative investments. I, therefore, leave it up to you to determine from what you have heard today, the extent to which one or any of the proposed smelters satisfy the criteria set out before.

Thank you, very much.

Mr. Chairman: Thank you very much, Mr. McGuire.

I think at this stage of the proceedings, although we are running very late, we have a discussion period. Really, the intent here was to invite questions from the floor

and to seek to get a comment or reaction from our presenters or from members of the panel. We have received several questions—there is no shortage of questions. I would try to deal with some of them now and, maybe, others after lunch at the next opportunity at the end of the day.

The first question I would like to bring to the forum—I would call the name of the questioner, the organization he/she belongs to and the question as far as I can decipher the handwriting. This question is from Mr. Anil Roberts of the National Food Crop Farmers Association. It is directed to our first presenter, Mr. Collin Pratt. It reads:

> Our Minister of Energy listed a number of alternative uses for our natural gas, for example, methanol, LNG, ethane, propylene and so forth. Would you then agree that Trinidad and Tobago does not fall into the category of lack of alternative uses for our gas?

Is Collin still with us?

Mr. C. Pratt: Could you repeat that question for me? Sorry.

Mr. Chairman: I would paraphrase it. It is basically asking whether given the several uses of natural gas that is currently being utilized, such as methanol, LNG and so on, whether, in fact, you would categorize Trinidad and Tobago as a country that is lacking in alternative uses as opposed to using it in smelter operations?

Mr. C. Pratt: The short answer to the question is, no. Aluminium is just another way of using natural gas. Trinidad already has a great variety of ways of using natural gas for economic development. Aluminium is another one. The question is whether it is a better one or a worse one than some of the alternatives.

Mr. Chairman: Thank you, very much. I would also maybe leave it to the panel. I would invite a panelist if they want to make an additional comment. Yes, Mr. Goddard?

Mr. G. Goddard: There is a lot of discussion on the issue of alternative uses and whether or not the use of natural gas for the production of aluminium is best, and the EMA does not necessarily treat with that issue, but it comes up for us in this context.

Whether you believe that we have an infinite supply of natural gas and land for industrial development, we do have limitations from the point of view of the environment. We have a lot of development taking place along one particular coast and the pollutants are being discharged primarily over the Gulf of Paria and passing through

some communities as it gets there, and, perhaps, further on. We need to be very careful that we are not just choosing what is good, but we are choosing what is the best because very soon, if it is not happening already, we are going to run out carrying capacity in the environment to absorb pollutants that have been discharged from these industries, both at our local level and when you look at the long range transportation of those pollutants. I think we have started to see some of that in other states.

So, when the landlords of the estate are choosing facilities to go there, they need to keep in mind that there is going to be a limited capacity of the environment to absorb pollutants and you would want to choose the industries that provide the maximum benefit and the minimum impact to the country, to use up that space in the environment.

Mr. Chairman: Thank you, very much. Another question is from Shivana Mahabir of the Rights Action Group. The statement is directed to you, Mr. Goddard:

> There are currently no environmental laws regulating air and water pollution. Does God/EMA plan to bring draft rules into effect prior to smelter start up?

Mr. G. Goddard: Whether the draft rules appear before the smelter start-up or not is up to the Government. We have drafted rules and it is with them and, I think, it is being given active consideration. In my opinion not having those rules gives me a lot more flexibility in terms of the CEC process. It allows me to look very specifically at the industry that we are talking about—specifically, the environment—and not be constrained by general standards that have been developed for the whole country. So, with respect to air and water pollution, for example, we are able to use national standards developed by the Trinidad and Tobago Bureau of Standards. We are able to use World Bank and USA based standards for air pollution and look specifically at that area to see what the flora and fauna there can handle or the people who live in that area can handle, and, at the end of the day be able to set standards that are very specific to the discharges from the smelters.

So, in a sense, you might argue that it creates an advantage by not having those standards in place.

Mr. Chairman: Dr. Coombes?

Dr. V. Coombes: I would like to disagree a little bit with my colleague. I think at forums as these we need to take the opportunity to advance a lot of the things that may have been sitting on shelves. So, I would encourage the stakeholders who have some of those things sitting on their desks to get off their butts, move a little faster and get some of those things enacted. Whereas the flexibility may be a good thing on the one hand, I think that it behoves us to grasp the opportunities presented at forums like these to get a lot of the things that we know need to be done but have not yet been done.

Mr. E. Keul: I would also like to comment with respect to the legislation and emission. The aluminium industry is a worldwide industry which is regulated and whether it is smeltering in Norway, in Dubai or Trinidad, the same rules will apply with respect to emission in the environment and no responsible company would build a smelter in Trinidad in order to get away from the requirements which the focused will be on the company that is building. Also, I cannot see why aluminium cannot coexist with agriculture, honey producing, fishing and these other activities. Today, with a modern aluminium smelter, modern production technology, state-of-the-art emission control, aluminium smelter can coexist with all those other activities. Also, people can work safely in the smelter and live safely close to it.

Dr. S. Smith: Mr. Chairman, can I remind all and sundry that there has been a tradition of self-regulation and self-monitoring by these companies. Their track record for probity, accuracy and dissemination of information has left much to be desired. In particular, there has been a lot of issues raised in South Australia, for example, in Victoria, with regard to Alcoa and their release of information. There was a hiatus of five years before information on the risk of cancer from the aluminium smelter in Arvida in Canada, was released to the workers in Australia. There has been issues with regard to the accuracy of monitoring and the reporting of monitoring levels in Australia as well. As with our country, there would be a disparity between the proclamation of a law and the enforcing of a law and there would be a difficulty with monitoring of the environment in that regard.

Mr. Chairman: Yes, Dr. Khare?

Prof. M. Khare: I just want to supplement Mr. Goddard's statement on the air quality standards. Actually, this is a very broad word. Air quality standard, generally, people

think, consists of the ambient air quality. It is not like that. Whether it is smeltering, petrochemicals or any sort of industry. It is a very broad activity which not only take the ambient standard, it should start with the emission standards which controls the process of an industry like whether or not that product is produced by how much we have used the fuel; it is called emission standards. Second is the ambient standard which tells the air quality in microgram per meter cube or milligrams per meter cube, which is the metric way. These are very important standards which every country should have. Trinidad should have the visitive of standards because most of the industries have visitive emissions and those occupationally, very hazardous emissions. So, those standards are now to be framed by way of a proper monitoring. Third comes now, standards for occupational hazards like explosive standards. The fourth is—especially, if there are pollutants like fluoride—fluoric standards to be framed. It tells the effect of fluoride on the plants, on the biota and other biological species. So, these four types of standards have to be worked out for any type of industry, particularly, with the smelter industry.

Thank you.

Mr. Chairman: Thank you. Dr. Monteil?

Dr. R. Monteil: I would just like to make a few observations. Now, I obviously stand corrected on the health aspect, but I think it might be possible to frame conditions in such a way that, if you like, the polluter would pay. In other words, in practice it might be very difficult to establish baseline standards within absolute certainty. I think there is a possibility that we might be falling into a trap of extremes. We know, for example, that x-rays do harm, but it does not preclude us in our day-to-day existence, using x-rays. I think what I am getting at is, from a practical perspective—I do not know if the EMA would agree with me—it might be possible, in granting approvals, to frame such approvals in a way that even if at the current time you are not aware of the damage, if at a later date it is proved that damage is caused as a result of the activity, then the polluter would pay. What I am saying is that there is a basis for framing things, binding agreements, to at least protect the citizens.

Mr. Chairman: I may switch pace a little bit. There is a request for a comment from a Francis Betrand of the Point Fortin Chamber. Is he here? If he is, I invite him, please, to limit his comment to a maximum of two minutes.

Mr. F. Bertrand: Thank you, very much, Mr. Chairman. On behalf of the Point Fortin or the Southwestern Chamber, I just want to shift the focus a bit on the developmental side to endorse quite a lot of what was said by Dr. McCree.

Before I get into that, I think this debate is here because we have doubts about the whole process; the question of the CEC and the EIA. I think we need to take this opportunity to ensure that the Government of the day provide both Town and Country and the Environmental Management Authority with the kind of resources and manpower that could keep pace with the development thrust of the country. That is very important.

I think, also, a case has been made for the question of why it is important to develop the southwestern part of the island, and we certainly endorse that at the level of the Chamber, but there are some preconditions. The question of the road infrastructure must be upgraded. The highway has been spoken about, but we are saying we want to start the highway from Point Fortin and from San Fernando because we cannot take these additional developments without this accompanying infrastructure.

Once the approval has been granted, I am certain our Chamber is fully in support of this effort. We also want to make the point that there is no reason why agriculture and industry cannot coexist. I think one point that Dr. McCree missed is that the oilfield model in the southwest, historically, every oil company—Shell, Tesoro or what have you—had a parallel agricultural development around their oilfield development, and that can happen.

Certainly, in the case of Chatham, apart from the 1,500 acres which we speak about, just on the other side of the road, there is a 600 acre abandoned farm, with arable land, which we could ensure, either through the government or Alcoa, that we can do a model agricultural project that the community in that area certainly could benefit from while we treat with the other issues.

So, I think it can be a win-win situation but I think we just need to be very passionate and insist that we respect the process and, with the required approval we, in Point Fortin, would certainly want to endorse this particular effort.

Thank you.

Mr. Chairman: Thank you very much. Another question from Ayana Dardaine of the Trinidad Youth Council. I think this is directed to Mr. Paul Lochner.

> What has been the response of the poor in South Africa? For example, did they object or understand the impacts of the smelter?

Mr. P. Lochner: What we have found with the consultations we have been having over the four years, especially with the Coega smelter, is that initially there was a very negative response from poor people to the proposed smelter project. And, part of the expectation was that the poor communities had in their mind the worst possible industry which they had seen; and industry just belching up the most smoke and the producing the most waste. They had in mind industries which were already 50 or 60 years old. What we had to actually go through was a process of consultation and communication over about two years or so, where we had more and more discussions with communities around what aluminium smelters are like and the risks and issues associated with them. This enabled the communities to have a more accurate understanding of what actually they were in for.

It ended in what is now a strong support for the project, Coega, from the communities. In this last November we had some feedback meetings in South Africa with communities living around the smelters and, overall, there is a feeling of "Right, we understand what it is about" and there is now quite a change in views from two years ago.

Mr. Chairman: Thank you, very much. Troy Lee of Rights Action Group asks:

> Along with energy, aluminium smelters require a constant water supply. How will the water requirements of the Chatham and La Brea residents be reconciled with the water requirements of both smelters?

Mr. P. Saith: First to begin, I need to correct that. Aluminium smelters do not require a large amount of water. From what I have seen the water would just be for potable use, drinking and that sort of thing. The process itself does not require water, unlike a methanol plant which uses over one million gallons per day; an ammonia plant uses half a million gallons per day; a steel plant uses a couple of millions gallons per day. From what I have seen of the smelting industry, it does not require any water during the process. The water that is required is for domestic use only.

With regard to the supply of water to the industrial estates, we have been working with the Water and Sewerage Authority and they have identified that the most efficient way of providing water in South Trinidad is not from wells. The wells in those areas

produce very little water. I am told that the wells we have, based on the fact that they are on the southern sands, they can only generate a maximum of 200,000 gallons per day, which is not very efficient in terms of WASA. So, WASA has indicated that there would be alternative sources of water that would be piped into the area.

To that point, I should point out to you that WASA has already imported the pipelines which would supply both the Union Industrial Estate and the Chatham Industrial Estate. I believe they are in the process of installing this.

[*Interruption*]

Mr. Chairman: Can we have some silence, please?

Mr. P. Saith: As I said, the pipes have already been imported that would serve those industrial estates as part of the overall planning for the estates.

Mr. Chairman: Thank you, very much.

Mr. D. Pantin: Can I get my five minutes?

Mr. Chairman: In a short while.

Mr. Pantin: I am afraid that what we are doing is we are breaking up into very specific issues, some of which relate to this afternoon's discussion. Quite frankly, I think that this morning's discussion, really, has been developmental implications. While I think we have had some very positive contributions, I do not think they captured a holistic perspective adequately. I, myself, had presumed, and was told, that I would get eight minutes in the panel here to present, what I think, hopefully, is a holistic perspective. Otherwise, I am not too sure this is making sense because we are all over the place. All of us have a million individual concerns which we cannot resolve today. What I think might be useful for us to resolve today is more or less a holistic framework within which we could hopefully find all of those questions answered, not necessarily today, but over the coming months as it were.

Mr. Chairman: Okay, Dennis, in a short while. But, I think it is also important that we, as we had promised participants and delegates, to have an opportunity to articulate on questions and seek some answers. I just want to go through maybe a few more questions before we turn to your holistic solution.

This is a question from a Mr. Gary Aboud of Fisherman and Friends of the Sea. It says:

> A recent statement made by Mr. Tabaneau of BG stated that there will be economic penalties for T&T if we run out of gas to supply Atlantic LNG and that we do not have enough gas based on proven reserves. What exactly are these penalties?

I do not know if Mr. Look Kin might be able to offer a comment.

Mr. Frank Look Kin: I am not aware of the penalties that are being referred to. There are contractual arrangements between the gas supplier and Atlantic in Train 1 and that is a 20-year contract. In other cases, it is the shareholder in the plant who has the obligation to deliver the gas to the plant for conversion into LNG. So, I am not clear in my mind – well, in the case of Trains 2 and 3, the gas supplier is also the part plant owner, so I am not sure of this penalty, that is being referred to, and in train 4, the same applies. I cannot shed any more light on that particular question that has been raised.

Mr. Chairman: Thank you very much. This question is from David Abdullah of Fytoon. Actually it is directed to Dennis. Dennis, here you are: You referred to the, I presume, Brewster Thomas study – I hope I got it right – that said that Alcoa will deepen regional integration by importing alumina. Intra Company transfers regional integration mechanisms.

A question from Curtlene Neptune, Cedros Composite School. With all the plans being made for the smelter, there bas been little mention made on the housing of the residents in the area. Can you tell me what plans have been made for housing? May be Prakash can answer.

Mr. Prakash Saith: As part of the overall development of the Southwestern Peninsula, there was a Cabinet-appointed committee headed by Professor Julien that was asked to look into providing social infrastructure that will be able to facilitate the development in this area. That committee has met and in fact has made recommendations for developing new housing areas. In fact, I saw recently where the Minister of Housing announced that there will be new housing area built in La Brea that will be designed in part to support the infrastructural development in the Southwestern region. You probably missed that but I saw that article in the newspaper about two weeks ago which arose directly out of the study by Dr. Julien and his group. I think they also spoke about setting up a new town also in the Wallerfield area to support the university thrust that is happening down there.

Mr. Chairman: Thank you.

Dr. Steve Smith: The issue of relocation is a very important issue and this is not something that has been unstudied. Mr. Basdeo Panday studied the landlessness in Orisa state in India. India has had one of the highest percentages of displacement and resettlement of indigenous peoples throughout the world. It has shown that the percentage of landlessness amongst displaced families; before displacement 25% in one area, 38% became landless thereafter. All of the studies have shown that landlessness increased following relocation.

The whole issue of the resettlement effect, as I said, the loss of the physical and non-physical assets including the homes, the communities, the productive land, the income-earning assets and sources, subsistence resources, cultural sites, social structures, network and ties, cultural identity and mutual help mechanisms all failed following enforced relocation. A home is never a home if you put it from Vessigny to La Brea or Vessigny to Wallerfield; never mind the structure of the house that you go and live in, it is not your home and that has created problems. In the turnover period of relocation there is always a problem with the educational aspect of the children because many times the education of the children will be deferred to pay attention to more pressing issues such as the need for the income that is earned to achieve other ends in the home rather than pay attention to the mundane such as the education of the children. Education is deferred in this population of people and often it is put off and in that case there are social issues as well.

Mr. Chairman: Thank you. I will take one more question. This question is from Mr. David Abdullah to Mr. Prakash Saith: If the EMA refuse the CEC for the smelters, are there any penalties or costs to be paid to the investors based on signed agreements with GOTT or NEC and, if so, what would they be?

MR. Prakash Saith: Certainly not. We are not responsible for getting the CECs; the respective companies have to go out, be it Alutrint or be it Alcoa, to get their own CECs. There are certainly no penalties that we will have to pay if they do not get their CECs.

Mr. David Abdullah: I do not think Mr. Saith understood the question. The question is: Assuming that the CECs were not approved therefore the projects could not go ahead, are there in the contracts between NEC and the investor or Government of Trinidad and

Tobago and the investor any resulting penalties because those approvals did not take place or did not happen? It is not about who has to apply, I know who has to apply; it is what happens if the application fails. Are there any penalties to NEC or the Government?

Mr. P. Saith: I understood the question fully. The answer is still the same, no.

Mr. Chairman: Okay, I will ask Professor Pantin to keep it as brief as possible and then we would break for lunch. There are many questions that we have received and I assure you that after lunch we would try to deal with as many as we can.

Prof. Dennis Pantin: Thank you for your kind indulgence, Mr. Chairman. Let me begin by saying what I am planning to do. I want to address the "Sustainable Development Planning Framework for Mega Projects in Small Places". It is important that the key words are not development, "sustainable development". - it is very important – "planning, framework and small places".

This has been prepared by a team of us from the Sustainable Economic Unit and I am simply, if you wish, the messenger presenting it. You can see the background on the slide; I do not need to read it. Briefly, I just want to make the point that some of us at UWI have been grappling with what do "sustainable development" mean in small places, particularly small island economies. The full Unit is entitled UWI SEDU (SIDS) – Sustainable Economic Development Unit for Small and Island Developing States. Our mission is to understand what is sustainable development through empirical and theoretical research which is policy-oriented.

What is the definition of sustainable development? It is not solely simply or predominantly about environmental conservation and management; it is rather about equity which includes economic, social and environmental terms. It has also come to include democratic processes, participation, consultation, transparency and public rights to information.

What is a mega project in a small place? It is a particular investment which will have significant national impact on the economy, on the society and on the environment. The economic impacts are listed there; some of them have been addressed already in the earlier presentation by Mr. Gregory McGuire and Dr. McCree. Some of the social impacts have been addressed and environmental impacts will come in, I think, more centrally this afternoon.

We suggest that there are two key elements of a planning framework for sustainable development in small places; one is a national philosophy and vision out of which will flow social economic and environmental objectives not really to 2020 but to 2050 and even to the start of the third millennium.

Secondly, a decision-making framework for all projects, including National Environmental Policy, a National Physical Plan and finally a Sustainable Development Plan including aggregation of all projects in terms of scale, scope and time for , say, continuing in five years. So, you cannot look at aluminium smelters alone, you also need to look at Minister Saith's other projects as he mentioned this morning, which he suggests are polyethylene**;** several of these plants which also need to be related to aluminium smelter so we get an aggregation across all of them.

I move on to the decision-making framework which suggests that one begins with cost benefit analysis. Now, this is economic cost benefit analysis; not financial cost benefit analysis. Economic cost benefit analysis takes into account the social, environmental and economic costs and benefits. Certainly, benefit cost ratios where in effect you are comparing alternatives along the lines that Prof. Spence outlined; you need to compare alternatives in terms of projects that are competing for the same raw materials, land space and human and financial assets.

Thirdly, you need comparative risk analysis and finally you need decision-making based on a judgment informed by the first three steps but requiring substantial defence if contradictory to the empirical results. Who knows? One could decide that the project should go ahead although it fails the cost benefit analysis or it could not go ahead although it passes the cost benefit analysis in terms of a number of judgmental issues.

Application to aluminium smelters: We have little in the way of a national vision beyond 2020 in which 99.99 recurring of the population did not participate in preparing and also remains ignorant of its contents. As a result, there are no derivative economic, social environmental objectives for over this period.

The National Environmental Policy (NEP) has been recently passed but limited public awareness and also clarification needed in terms of the extent to which irreversibility and precautionary principles are highlighted. The irreversibility principle becomes extremely important in a small place because if you make a mistake in a small

place - we know of all these very stringent standards on safety and so on but in life the probability of error exist.

What happens if there is an accident in one of these mega projects? What are the implications for the population and possibly for the land space? The best illustration: Chernobyl .affected an area several times the size of Trinidad and Tobago. We need to address that. The cost benefit analysis for Chatham cannot be complete since the EIA and SIA are not in. The situation with regards to La Brea requires clarification. There has been no indication that alternative uses of natural gas and other resources have been identified and analyzed, hence there is inability to conduct the benefit cost ratios analysis together with comparative risk analysis.

Conclusion: A final decision on the La Brea and Chatham projects ought to require, at worst, comparison of alternative uses of the natural gas inputs, land space and the human and financial capital costs the society would have to incur from each option, inclusive of the social and environmental costs; such decisions based on full public disclosure.

I disagree therefore with John Spence's recommendation that economists should try to run models assuming the prices because they will not be revealed. The natural gas belongs to the people of Trinidad and Tobago; the prices should be revealed. *[Applause]*. Unless compelling economic reasons are advanced, there also should be the opportunity to articulate a national consensus prior to ultimate decision-making.

Here I agree with Professor Spence: the economy is in fact booming, it is overheating; there is virtually full employment; there is no urgency to rush into new investments of this kind. These investments will be irreversible in several respects including their demands for natural gas.

If I listened to Gregory McGuire very carefully in terms of his implications of the actual gas price and I listened very carefully to one of the earlier speakers in effect saying we have seen two trends in the international aluminium market: demand is growing but there is a falling demand for the energy source which will be high in CO2 content given climate change; though sources of energy which are less CO2 intensive will increase in price. At what price are we negotiating and will our prices be stuck at such a level that in five' years and in ten years' time when those plants have to shut down when it becomes

apparent when one major tsunami hits the United States, for example, and they say, "yes, climate change is really happening, we now have to cut back" and they begin to take decisions, they begin to close those plants, therefore the energy requirement becomes important.

It does not stop with the smelters; there are a whole series of energy-intensive industries that will need to shift to lower carbon-intensive sources of energy, including natural gas, as the climate change reality becomes clear. As a result, the price of natural gas will go higher; have we not made, perhaps, sufficient errors in terms of our natural gas, by existing commitments to LNG 1, 2, 3, 4 to continue that particular process?

The proposal is we should wait and take our time, using a framework somewhat like this; framework is not cast in stone; in fact, we have produced a discussion brief which I will share with participants which articulates a little more in detail some of the issues I am raising. I am suggesting that we pause for a moment; use this opportunity or this initiative. I complimented the Government for its responsiveness to this particular event. I think my colleague is wrong; it is not the first time: governments have responded to other issues, including the Toco Project as well in terms of peoples getting up and responding. I think we should pause, take our time, review our planning, our vision for this small place over the next twenty, fifty and one hundred years. Thank you. *[Applause]*

Mr. Chairman: Thank you very much. As I said, we will adjourn for lunch.

Suspended for lunch at 1.55 p.m.

Resumed at 2.55 p.m.

Mr. Chairman: Welcome back, Ladies and Gentlemen. Our first speaker this afternoon is Prof. Julian Kenny who will address us on the topic: "The National Environmental and Planning Law and Policy International Obligations and the Aluminium Industry in Trinidad and Tobago". Professor Kenny needs little introduction. You have in your brochure a very comprehensive curriculum vitae on him, so without further ado, I would go straight into the programme and invite Prof. Kenny to start his presentation. Prof. Kenny.

Prof. Julian Kenny: Mr. Chairman, there was a suggestion that I should change the title of my presentation and I thought this was going rather far because what I have to say

would apply to any heavy industrialization on the Southwest Peninsula; whether it is oil refinery or whether it is a polypropylene plant or whether it is an ammonia, it would all be the same because I am not really particularly concerned with the aluminium smelters per se.

The curious thing about what I am going to present to you is that it was not the first time I have been asked: "Are you a lawyer?" and I have had to explain to people I am really just a humble biologist; I may know something about the law. I was asked that by someone from Alcoa who phoned me when I had the temerity to publish one of my regular columns which I call: "Bhopalizing Trinidad and Tobago". Within a few hours of publication there was a phone call from Alcoa in New York and amongst the questions asked were: "Are you a lawyer?" and I said, "No, I am just a humble biologist." Today, a doctor from Yale asked me: "Are you a lawyer?" I mentioned this because law has a very important part to play in civilization and I am afraid in our society, law is really rather meaningless.

My presentation looks not at aluminium smelter but at process. I am going to go through the thing. There is an abstract which I will not spend much time on, if I can get the technology to work; you see, it never works for me. Well, we can forget the abstract; it is in the published paper. I sincerely hope that the organizers of this symposium, when they make the proceedings - because no symposium is a proper symposium unless there are formal edited proceedings - I hope that my original paper goes in; not what I have to say and not in the light way in which I might present this. So, that is just the abstract.

I would like, first of all, to emphasize something for all citizens and visitors to this country. We have a Constitution and the Constitution binds the Government to Parliament and these are the words of section 75(1) which gives the power to the Government, that is, to the Legislature or to Cabinet. You will notice in there I have had to put in a couple little "sic" to point out that that is what appears in our Constitution. I am going through this because when you look at our National Environmental Policy which has been approved by the Parliament of the country, I have been able to write eight pages of editorial corrections to it but that is our Constitution. This is very important as you will see when I develop my argument a little later.

The second thing is the law governing the use of physical space or land. The law under which we operate is the Town and Country Planning Act of 1960 which was proclaimed in 1968 so we are still working under an ancient law which was picked up from the United Kingdom.

People tend to think of Town and Country Planning as regulating developments and so on. The Town and Country Planning Division of the Ministry of Planning has a very important role and this is to plan the developments of the country; the physical development, the use of land. In a country with a population of 260 per square kilometre, planning is very important; it is not like in Australia where the population density is 300 per square kilometre.

So, there is the Town and Country Planning Act and it is very important to know that very early in the Act, it says: "shall secure consistency and continuity." Now, in the English Language this has one meaning. You got to be consistent and you have got to have continuity. Then it goes on to say: "use of all land in Trinidad and Tobago in accordance with a development plan prepared in accordance with the provisions of Part II." of the Act. In other words, there has to be a plan and the Minister cannot do whatever he wants, the Minister has to act consistently with that plan. Herein lies the problem. At one stage, physical planning went through a complicated process in which there was public consultation, and written submissions. The National Physical Plan for Trinidad and Tobago went through a process for about 15 years before it was finally approved by Parliament.

Now, that is the law of the land. I might point out that the law also requires the Minister, every five years, to do further studies and revise the plan and then take it back to Parliament. It has to go back to Parliament, but since the plan was approved by Parliament in 1984, no minister of government, whether it was NAR, PNM or UNC, has thought it necessary to go back to Parliament with a revision. Consequently, planning, per se, in the country has been abandoned and has now been handed over, in effect, to the National Energy Corporation, another ministry, and this has very serious implications for what we do with the country.

Now, that is a national physical development plan and I would focus a little more on it later on. But that there, the dark green, is the forest conservation area; the lighter

green is agriculture and the white is agriculture. Then, you will see areas that are reserved for rural development.

My argument is, simply, that until such time as that plan is revised and approved by the Parliament, that anything that is being done other than that, is contrary to law. Now, when we think of the rule of law people tend to think only in terms of criminal law. But the law of the land has to be observed by everyone. The Cabinet of the country may not, in law, do anything contrary to law. It is a very simple principle. Yet, we find all sorts of things happening contrary to law.

Let us now move on to the Environmental Management Act 2000. I am not going to go into any great detail here, but just to point out that what is laid in Parliament is not on the whim of the Environmental Management Authority. It is laid in Parliament by a Minister and a legal notice follows. So, the Environmental Management Authority can make all kinds of standards and so on, but if the Government decides not to take those standards to Parliament, that is the end of the matter. And, we all know, in fact, the only standard in law is noise pollution which everyone knows is ignored anyway.

We also have a rather peculiar history. We go abroad and we sign all sorts of conventions. I wish Dr. Saith was here because he was instrumental in us signing the United Nations Convention on Environmental Development in 1992, and Agenda 21 on the Biodiversity Treaty and all those things... It was Dr. Saith who did this in 1992 in Rio. We signed many of these treaties—I have put a couple them up there only to point out that all of these treaties require domestic legislation of one kind or another. We take the first one there, *Convention on International Trade and Endangered Species (CITES)*, signed in 1984. It requires domestic legislation. It has not even been drafted. If we go to the next one, the *Convention on Wetlands of International Importance Especially as Waterfowl Habitat* (Ramsar) was signed in 1992. This required domestic legislation and nothing has been laid in Parliament as yet.

If we go to the *UN Convention on Biological Diversity*—this is what I am going to speak a little about—that was signed in 1992 by Dr. Saith on behalf of the government. That required specific initiatives and it requires legislation. It has not reached there yet. Then we have the Basel Convention which was signed in 1994. In my paper I have, in fact, put in parts of the Basel Convention because Article 3 requires us to make domestic

legislation. Since 1994 and it has not even been drafted. So when people talk about using the Basel Convention, we are up against a whole series of problems, not the least of which is, we do not have any domestic legislation.

Then, we have the Climate Change convention. Do you know that we were number six in signing this protocol? This suggests to us that we are very serious about carbon emissions, but, in fact, while we are signing this, another part of the government is taking steps to burn more natural gas to double the amount of carbon dioxide that goes into the air. In fact, the Prime Minister is talking proudly that we might become number one in terms of per capita, of CO2 emissions.

The other thing that I find rather—this one is very important. I mentioned the national environmental policy that has gone through all the echelons of the EMA; it has gone through all the ministries and Parliament and is now a formal document. It has about eight pages of editorial, grammatical, typographical and crazy errors. Nobody reads it; clearly they do not read what is written. I want you to read what I have underlined.

> "*Communities should be given an opportunity to share in managing their local resources and the right to participate in decisions"*

If Yvonne Ashby is here can she tell me whether anyone invited her to participate in these big decisions? I would pass over that one, but the important one there is the community participation.

Then there are other things there that I find, as a humble Biologist, absolutely puzzling. You can read it. I do not know what to make of it because they talk about" tending to bring into conflict the environment." Environment is a physical thing with environmental protection which is a rather abstract process. How you got conflict? So what are they saying? We are going to have development and to hell with the environment? Let me move on.

Let us look at the southwestern peninsula. This is the geology of the southwest peninsula. The yellow there is the Erin formation and you can recognize Point Fortin. Just going down the South Trunk Road you would see where—what they call Chatham is actually Cap-de-ville—where they propose to put the Alcoa smelter. The Alutrint smelter is further up the coast. Now, look at that, there is a major Fault across there

which is the Los Bajos Fault. You can see the displacement of the Erin formation over several kilometers. You will see down below, the red there, this is lignite and clay and you can see where the lignite has been burnt into porcelainite. This is the basic geology and you have now, that is the syncline and the line below is the anticline. Along that anticline you get eruptions of gas and mud. In the last century we had three islands, actually, come out of the sea. They did not last very long, but anyway, this is just a little treatment of geology.

This is the southwestern peninsula. This is the vegetation. The dark green is forest reserves. With a little bit of imagination you would see that there are forest reserves on either side of the South Trunk Road and there are crown forests on either side. The peninsula is dominated by forests.

I would like to just point out that I have been studying the southwest peninsula for about 50 years. I am interested in fish biology and biogeography and I have a listing there of species of plants and animals that are found in Trinidad, nowhere else but on the southwestern peninsula. Had this been the United States, and had somebody attempted to have an industrial development, this thing would be stopped because of area endemic species.

My problem with this is that the government will think in terms of declaring environmentally sensitive areas, like the Nariva Swamp which has fewer area endemic species than the southwestern peninsula. The southwestern peninsula, they are quite happy to have bulldozed as they bulldozed Union. This is for the record, if anyone wants more detail on where you find these things they will have to seek an authority on it. Remember that.

Now, I go down to the southwest peninsula and the map is right. This is actually a fragment of the National Physical Development Plan; remember this is a statutory plan. You cannot play with this. The Minister has to seek continuity and consistency according to the law of the land. The Minister of Planning, not the Minister of Energy. There you see the white is agriculture, the striped green is intensive agriculture and the heavy green is conservation areas, forests.

I am going to go through these very quickly because I want to come to the conclusion. Just for the record, I will just go through, there are three estates: Union,

which was originally offered to Alcoa, but Alcoa declined—I am not telling you hearsay, the man from New York told me that, and I have it recorded. They were offered that site but it did not suit their needs. He also clarified for me that it was the government that wanted an aluminium refinery here, Alcoa did not want one. Listen, I am a humble Biologist and Scientist, and I record these things; all sorts of things, fish and conversations.

The next one is Cap-de-ville. Cap-de-ville is on the northern side of the South Trunk Road, south of the Cap-de-ville junction, via the beach road that goes down there to Irois Bay. That is where Alcoa is asking to have about three square miles of our country.

The third one is Chatham. Now, the National Energy Corporation actually applied to the EMA for a Certificate of Environment Clearance to put another industrial estate there because Alcoa did not want anybody else on their site. Then, eventually, it was withdrawn, but that is an area of mixed communities—real mixed communities—that go back generations. The people are highly resourceful. They may not have a job in a factory, but they have their garden; they have a little part time something, but above all, they have clean air. When I wrote this, it was not yet made public, what was planned for this area. In that area, the Chatham Valley, there were churches, community centres, schools, houses, everything.

I would tell you one thing about the EMA; it is one of the most transparent institutions. In fact, if everyone is as transparent as the EMA we would know what is actually going on. This is a letter from someone called Meyers—I have never met him—to Glen Goddard about the standards that the EMA is proposing. You would see what they say there, that they are unnecessarily stringent and cannot be achieved with the best available technology for aluminium smelting. So, if the standard which the EMA has decided on is now shifted up, everyone can conclude that it is political that the Authority has no independence whatsoever. If that thing moves from the one microgram to anything above that, the EMA has just joined the rest of the public sector in drawing salaries.

You see here what Alcoa has said; it will cost an extra $200 million to put into scrubbers. I do not think the shareholders would like this because the profitability would not be as good.

Next, let us to go Alutrint. This is to Dr. McIntosh where we believe the proposed drafts are unnecessarily stringent. It almost sounds to me like collusion because they use the same words "unnecessarily" and "stringent".

Now, let us get down to my conclusion. Cabinet is in breach of its constitutional duty to account to the Parliament of the country that represents the people. When Sen. King, who was chairing a constitutionally appointed committee of both Houses of Parliament, invited people to come from—a member, Mr. Look Kin came but other eminent people refused to go and they got a runaround. That is the Parliament of the country wanting to get facts and information and they are denied it. That, to me, is contempt of Parliament and contempt of the people.

Secondly, Cabinet, in my view, is in breach of the Town and Country Planning Act by not ensuring that the minister responsible has met the mandatory requirements. They have to have consistency and continuity. You cannot just have a statutory plan and then Cabinet decides. It is not Cabinet to decide. Everything, the overall planning has to be approved by Parliament. Parliament does not generate the plan, it approves the plan.

I am just pointing out a few of the things: Establishing smelters there contradicts their own National Environmental Policy. If you read through the policy it abandons the precautionary principle and it does not permit or refuses to permit the NGOs in the area to participate in what is going on. I am not telling you lies, I am telling you reality.

Then, going down there, number four, is the Convention on Biological Diversity that Dr. Saith signed on behalf of the government of Trinidad and Tobago in 1992. If you read the convention it says, under Article 8, that we are supposed to do in-situ conservation in all our unique eco systems. So, when you go in there you are actually abandoning—you are surrendering—that area to industrial development and all that goes with it.

I would just point out here that the southwestern peninsula is biologically unique. I am not telling you hearsay; I am talking about work that I have done and published and what others have published. This, in my view, demands a regional plan for the

southwestern peninsula that goes beyond whether you have smelters or not, it requires economists, sociologists and, above all, planners. Unfortunately, I think it is now beyond the capabilities of the appropriate ministry, the Town and Planning Division.

One of the big problems that Prof. Spence has been talking about for 50 years—he and I go back a bit—is that we are alienating agricultural and forest land; we are breaking up rural communities all for progress. And, as he points out, once you cast that concrete, it is no going back. Dennis Pantin was also talking about the irreversibility. The other point I would like to make there is that Cabinet has refused to acknowledge a proposal from the people down in the area for an alternative development plan for the region. I have actually seen this and I go along with a lot of what they proposed, but it has not even been considered, or they have not even been acknowledged.

This is the thing that is so worrisome about the CEC process; it is fragmented. You cannot run a smelter without a port. You cannot run a smelter without a gas line running to the electricity generating plant, yet, they are doing it piecemeal. Had I been the Chairman of the Environmental Management Authority—the possibility of that is about the same as me swimming to Nigeria—I would have just simply said, "You want to come here, okay, CECs for everything and if you do not like it, make an appeal to the Environmental Commission." That is what we set up the Commission for; let the Commission rule. In other words, I would simply dig my teeth in and say I want it done properly.

I go on there to point out there is a problem here. The EMA can set standards with their CECs and theoretically citizens are supposed to be able to make complaints, but the EMA has very little monitoring capabilities. It goes back to "the developer will monitor and publish". Now, people can publish, virtually, anything. My point here is that the standards have to be in law and, as Dr. Coombes said, you can build on them. So, there is a big problem there.

The next thing that intrigues me is that people talk about smelters but only a small fraction of the world's countries actually smelt. Countries like Japan consume vast quantities of primary aluminium, so does South Korea, but South Korea does not have a smelter. My point is, if all the talk coming from the top has been downstream, downstream, downstream—as Prof. Spence has pointed out, they said that they are

already doing downstream—why bother with the smelter? Why not take that space and concentrate on the downstream? We know the downstream would not be a rather crude level; it is really like our sugar industry at one time we only produced brown sugar and then we made a little bit of white sugar.

My personal view is that we should stop all consideration for such time as is necessary to go into this business and leave that to proper economic and social planning and, instead, use the Union Estate to go downstream; it is close to the sea and so on.

I think, also, that we should seriously go back to what Eric Williams proposed. He actually proposed a regional aluminium industry in competition with Alcoa and Alcan. Let us be careful about that. He was not thinking in terms of getting them to come in and setting up for us. I just wonder why we should not consider what Prof. Spence has already mentioned as one option.

Then, the final conclusion is that we should really be thinking in terms of doing proper, comprehensive feasibility studies which would lead to the necessary planning; to use the resource of the southwestern peninsula in the interest of the people there as well as the people of Trinidad. I ask the question: You want a smelter in a park? Why not put it in Chaguaramas? Tell me, why not. There is nobody living there yet, although the housing people are moving in. But it is beautiful flat land, you have energy, you have the aluninium terminal there, why not? I would lay down in the road against that, obviously. Or, why not put it in Lowlands in Tobago? The hotel is not profitable. Smelting is profitable.

My point is, in summary that the Cabinet has failed in its responsibility to the Parliament. It has not kept the Parliament informed and when the Parliament tried to find out, they were blanked. Secondly, anytime the Prime Minister or any minister talks about the rule of law it is more than criminal law and corruption. It is also the rest of the law and they must exercise continuity and consistency. If they do it properly I would have no objection. If they did it properly and they went to the planning people, developed a regional plan and did it in consultation with the people down in the southwestern peninsula and the national community and they came up with a regional plan that involved something like that, I would be the first one to say we are a democracy and the will of the Parliament, and therefore the people, would prevail.

Thank you every so much.

Mr. Chairman: Thank you, very much, Prof. Kenny. Again, moving quickly along, we have the next speaker with a very interesting, but complex subject. We are pleased to have with us Dr. John Scire to make a presentation on this subject. Again, I will not go through his extensive biography as it is in your handout, but I would quickly invite Dr. Scire to address us.

Dr. J. Scire: Thank you, Mr. Chairman.

The topic for me today is air quality modelling which is an important issue relating to the proposed aluminium facilities. What I would like to talk about is what we do modelling for in this type of situation; what is the purpose of the modelling; to talk a bit about the types of models that are used and then to get into the specific types of information that are used for modelling facilities such as in Trinidad. I would also like to mention some of the complexities associated with modelling aluminium facilities which are different from other types of air pollution sources that are becoming a model. Then I would go a little bit into the model evaluation history to give you a sense of how accurate the air quality models are for this type of purpose.

The use of models in this type of situation is often related to the assessment of the impact of resource that is proposed such as the two aluminium facilities. Because the facility does not yet exist it is important to be able to predict in advance what the impacts would be running on in the process so that a plan can be done to minimize the air quality impacts on the facilities.

Also, a model can be used to determine what the specific impact is on an individual source within the facility or background sources from other surrounding facilities. For example, an aluminium smelter may consist of both pot rooms and a variety of stacks in the model and predict the amount of impact of each of those sources which is very useful for designing and planning purposes.

Another element of the modelling is that the model will include many site specific factors in determining what the concentration impacts are. Important things such as train elevations, proximity to the coastline, land use, individual characteristics of the sources themselves and the model would predict the effect of those at each point where you place receptors, which are the points at which the computations are made.

A very important element of modeling is to use the results of earlier modeling to determine whether there are environmental problems and if so to try to mitigate those problems by changing the design of the facility. That might be related to **star** types, maybe the location of the facility and the property. Also in terms of planning studies, just to determine whether a site is suited for the facility or if there is a better site from an economic point of view and to optimize the layout of the site where the facility is within the boundaries of the location. In a design of buffer zones affect site locations where the impacts will be designed so that they fall below air quality standards.

A model can also be used to help design monitoring networks to determine where the peak impacts are being predicted to evaluate how the model is performing. Generally in terms of land use planning, the same facility may have a much different impact on people depending on its location relative to populated areas and other factors such as the train, weather conditions and other types of conditions like that.

In the United States there is a set of guideline models which are defined to be models which have been recommended, reviewed and approved by the UEPA. There are two models that are used that are appropriate for modeling bathrooms from aluminium reduction facilities. They include the Calpuff Model and a model called the BOP Model. Calpuff and BOP are both guideline models and what that means is that the UEPA has reviewed them and approved them for regulatory application such as this.

The history of guideline models is such that it takes a very long time to go through the process to have a model designated as a guideline model. There is an evaluation phase where the model is evaluated against observations to show that it is capable of predicting accurately the impacts of the facilities that it is intended to be used for. Also there are requirements on the opening code and access to code and documentation. Also there are additional requirements of a public process which in the case of Calpuff took about six or seven years to complete, with several public hearings including one in Washington DC , in review of the modeling techniques. So this status of guideline model is a very difficult one to obtain; and it is a very high bar to achieve. Once the model has achieved that status then the regulatory agencies will approve its use for the application for which it has been approved.

There are two types of models: a city State model which is BOP and a non-city State model. Non-city State model is best suited for complex flow conditions which are defined to be situations where the flow is not constant; it might be due to the proximity of the facility to a coastal boundary; it might be due to train; it might be due to recirculation especially with the sea breeze whatever complicating effects such as those.

There is also fumigation. If a facility is located near the coastline, there is the potential for it to experience coastal fumigation which is a plume embedded within a marine layer is transported in line and then it experiences the high turbulence associated with the over-line boundary layer and therefore you get rapid mixing. This is a very important element of the process to try to model correctly in a coastal-type situation.

Also what is shown here is how winds respond to train elevations. They do not necessarily have to be high mountains but relatively modest hills can deflect the flow so that they are changed by the train elements. The process of dispersion of plumes in the atmosphere is very different over land versus over water so any time you are near a coastal boundary the ability to distinguish land versus water dispersion can be very important and something that you would look forward to in an appropriate model for this type of situation. This is just showing the coastal site; it is not in Trinidad but what it is showing is the recirculation associated with the sea breeze. Whenever sea breeze, land breeze circulation exist, you get reversing flows in that there are large plumes emitted to be brought back over the source area as a result of the recirculation process.

Now in modeling for Trinidad there is some very important site specific information to enter into the model. That includes things such as train elevations and land use, geophysical data such as that; as well as source data.

No aluminium facilities are the same. In fact, no two are the same because they have different characteristics, different layout; different stack heights as in the location relative to other features such as train and the coastline can also be quite important. What goes into a model to make it site-specific includes stack data such as the height of each stack, the characteristics of the stack, the emission rights, the location .and also building structures. One of the very important things that affects dispersion is a process called "Building Downwash"**;** a stack located close to a building will be affected by that; the

dynamic effect of the flow around the building where it can greatly influence the concentrations predicted from that stack.

The final item which is very important and quite site-specific is the meteorology. Meteorological data needs to be entered into the model. The winds here are quite different to other parts of the world and that is something that has to be specific to the analysis that is being conducted.

Well, in terms of the geophysical data sources, where do we get it? In Trinidad it is available from databases compiled by NASA. For example, the shuttle radar topography machine train data set, which is a space shuttle train data set used in global land use, land cover sets as is shown on the right-hand side.

Meteorological data: One of the best ways to obtain a good three dimensional meteorological feel such as winds and temperatures is to use a coglastic meteorological model; one example of this is called MM5. MM5 stands for the scale model version 5. It is a model produced by the National Centre for Atmospheric Research. It allows you to nest grades so you can see both the large scale picture, as you see on the right, and then zoom in and find a resolution to the area of interest for the air quality modeling as you see on the right-hand side. Ultimately, what you end up with is a modeling domain such as is shown here in the local scale; for example, this is showing a grid resolution of 200 metres which is a very detailed local scale and you also see the train elevations padded for that location.

The modeling of aluminium facilities is sometimes a more difficult thing than for other facilities because of the presence of the pot rooms so as a result of that there are special modeling techniques that have been developed over the last twenty years or so to model aluminium facilities properly. They include the ability to treat the line sources which are the pot rooms' emissions; they treat the buoyancy of those sources; they treat the way that the planes are affected by wind direction relative to the building and also a process of multiple sources which relate to the presence of multiple buildings within the facility.

There are some complexities in modeling the environment here which justifies the use of a non-city state model such as the coastal influence, the occurrence of light wind

speed dispersion and the potential for stagnation and recirculation-type events. This is just a schematic showing the flow around the building.

When you introduce a building into the air flow it produces lots of different effects. The streamlines go up and around the building, go over it; it introduces high turbulence which increases the rate at which the plane can be brought down to the ground. It can produce concentrations which are much higher than in the absence of buildings. One of the evaluations is: are the stacks tall enough to avoid this effect at an individual facility, and modeling can evaluate that.

This is just showing a generic layout of an aluminium facility: you would have the pot rooms which would be the long buildings in which the pots fit into the reduction process; and a series of individual points which are stacks. Normally the stacks in apartment buildings may interact and you may have some building downwash effects associated with that.

This is showing a cross-section of the apartment buildings; the flow comes in the sides and goes out the rooftop vent; and the plume rise associated with those gases released from the rooftop vent are warmer than the ambient temperature so therefore they are less dense so they rise and the way they rise is a complicated function of the wind direction and other factors. The detailed line source models in BOP and Calpuff both have special algorithms to deal with this type of situation.

This is a plot showing the plume rise as a function of the direction relative to the line access to the pot room; they can be quite different. This has very important implications for the impact of the facility on the surrounding area to get that wind direction dependence.

On the left-hand frame is shown the profile of concentrations down wind of the line source. Then what you see on the right two frames is approximations to that, that you get if you model that source as a series of point sources instead of using the line source algorithms.

Evaluation is part of the process that was involved to get the models accepted as guideline models. A series of studies were done to evaluate the predictions of the models versus concentrations. The firs study was the wind tunnel study where two facilities were

put into a wind tunnel and then evaluated through this wind tunnel type physical modeling and compared to the model predictions.

The second two studies I want to talk a bit about; one is the Tracer Gas experiment conducted in a facility in the United States and the other study involving the emissions of SO2 from an Alcoa facility in Tennessee. There are different model approaches and what you see here in the receptor column at the top, and we can observe the concentration pattern from a line source from a pot room shown in the middle. You can see what is happening is that the plumes are being mixed out to the ground quickly but as you go further down wind. the plumes actually rise off the ground; this is the plumes touch down and then lift up approach that you will see in the light wind speed conditions.

The BOP model algrinims are shown on the right hand top frame and they do very well in predicting that type of behaviour. Not all models are equal in their ability to deal with aluminium facilities. You can see the footprints; the contours do not look similar to the observations at all. Then at the bottom frame there are different assumptions about alternative ways of modeling aluminium plants that have been done in the past and you can see that these alternatives do not work very well either. That was on the low wind speed case.

On the high wind speed case, you can see that the observed concentration pattern has been stretched out so the lift up of the plume has been delayed then the BOP algrinims do very well in representing that dependency as you can see on the right top frame. In the other models it does not do very well although the IOC models do better than the others, it still over predict by substantial amount the actual concentrations.

So the conclusion from the SO6 study is that the special algrinims that were developed in the BOP model which is the accepted guideline model by the USEPA do reproduce the important characteristics of the dispersion patterns. Now, this is the second study and there is an entire report for both of the studies, I just extracted a few of the figures. This is showing the observed list of predicted concentration distribution for twenty-four hour SO2 averages and you can see that the accumulative frequency distribution matches quite closely. The observations and the predictions match quite well, much better than the SO2 which is sometimes attributed from model to model.

With the proper emissions and data and proper dispersion model, one way you can do much better than a SO2 in terms of predictions. You can see here that the entire distribution is reasonably predicted for the concentrations of this facility. This is just showing one observation and prediction. The models are by nature somewhat conservative - that is by design - so that they are intended to be a bit over predicting; it is better to over predict the impacts than to under predict them; and the model behaviour that has been demonstrated with BOP and the Calpruff models show them. Here you see the numbers are close but they are slightly more conservative than the predictions.

The Calpuff is the non-city State version of the model that is commonly used for cops to explore situations and it is based on the BOP algrinums so it has those special line source treatments in the model to treat the pot room emissions properly. It has been used quite a bit throughout the world. Here are some examples of facilities that have been involved in different countries. Calpuff itself is widely used. It has undergone the guideline process in the United States and it is used in quite a few countries throughout the world.

To summarize what I wanted to say in terms of an overall point to take away is that the state of the science in dispersion modeling at this point in time is such that there are techniques that are widely used and well established and have been properly evaluated that can predict the impact of facilities accurately with some degree of conservatism but with a reasonable degree of accuracy; and these are useful for planning purposes and for plant design purposes.

The second point is that every model requires site specific data. It is very important to put in the characteristics of the sources and also to account for the meteorological conditions that exist at that site. A one hundred and twenty-five metric tonne facility in Canada, that footprint will look quite different than 125 metric tonne facility in Trinidad even if the facility itself is very similar, just because of meteorological differences in terms of the winds and other factors affecting dispersion. Thank you.

Mr. Chairman: Thank you very much, Mr. Scire. Our next presentation is a video conference presentation on Emission Standards for the Aluminium Industry by two representatives from the United States Environmental Protection Agency. They are not

with us here today but we thought the subject matter sufficiently important for us to seek to get this presentation to you. If you bear with me a minute, we would see if we can establish telephone contact with the presenters. They are Mr. Steve Fruh who is the Group Leader of the Metals and Minerals Group of the United States EPA and Dr. Donna Lee-Jones, an Environmental Engineer with the United States EPA.

We are having difficulty getting in touch with Dr. Jones at this moment, so I suggest that we go on to the next presentation for the time-being and hopefully after that presentation we may be able to re-establish contact with Dr. Jones.

Our next speaker will therefore be Dr. Oyebode A. Taiwo who will speak to us on the subject: "Managing the Health Impacts of Aluminium Smelters". Dr. Taiwo. *[Applause]*

Dr. Oyebode A. Taiwo: Mr. Chairman, Ladies and Gentlemen, thank you for having me here to have this discussion in Trinidad and Tobago. Over the next twenty minutes I will be talking about managing the health issues associated with aluminium smelters both in workers and in the communities in the vicinity of the smelters. I will talk about the strategies that are currently being used to mitigate negative health impacts that some of these facilities might have.

To give you a little background about myself - it is in your handout. I am from Yale University School of Medicine. In 1977, the university and Alcoa developed a partnership to provide Occupational and Environmental Health and Safety consultancy to them. I was one of the persons assigned to this project and I have been working closely on this issue for the last ten years. To oversee this relationship, an independent Advisory Council was set up.

In order to understand the health impacts and how health impacts on the environment in the community as compared to the workforce there are certain things that we need to have at the back of our minds. When we are thinking about workers, we are thinking about people between the ages of 17 and 65 years of age; individuals who have high exposure to different materials, and there are more options for control within a plant.

On the other hand, when we are talking about the community, we are talking about children, pregnant women, elderly people. The kinds of exposure the communities

experience is lower than what is typical in the facility and the main control for the community is the need to limit air emission, control of waste and water discharge.

One the one hand, employees can be easily monitored; it is more difficult to monitor people in the general community. Most of the information we know about health issues of almost every occupational and environmental setting is based on studies that have been done on employees and there has been in fact the community.

As we heard earlier on, the aluminium smelter process requires three basic processes; one is mining of bauxite; the other is refine of bauxite and the third process is the smelting. The rest of my discussion will be focused on smelting.

The smelting process has been in existence since 1886 and there are two main technologies: the older Soderberg and the newer, Pre-baked technology. In the Soderburg technology, something called the anode – which I will talk about later on - is baked in the pot while in the pre-baked smelters, the anode is baked in a separate facility. In this process, alumina which is the white product that we get in Chaguaramas is dissolved in molten cryolite; cryolite is sodium fluoride and aluminium. This is contained in a large steel container called the pot.

It is an electric driven process as we have heard, and what happens is that an anode made from carbon is inserted into the pot and the current moves from the anode through the cryolite to the base of the container which is the cathode and in that process electronic reduction is caused and the aluminium is generated and settles at the bottom of the container.

This is just a schematic diagram of what I have described. The container contains molten cryolite and the base is the cathode. In this process, there are several emissions generated, mostly fluorides from bath, particulates, which is really the alumina and particulate fluorides, sulfur dioxide and PAHs which are Polycyclic Aromatic Hydrocarbons.

Just to summarize, the primary emissions from aluminium smelters include: PAHs, fluorides, particulate fluoride, sulfur dioxide and alumina dust. What I would do is go over each one of these substances and talk about their health effects.

Coal Tar Pitch: Coal Tar Pitch Volatiles is a distillation produce from coal and it is made up of a group of chemicals called Polycyclic Aromatic Hydrocarbons. Polycyclic

Aromatic Hydrocarbons (PAHs) is a known cancer-causing agent. Sources in the aluminium industry are both from the carbon anode and from the carbon cathode. This is important to point out because this chemical called PAHs is found anywhere that you have incomplete burning of almost any fuel, so it is found everywhere in the environment. Common sources include: forest fires. In Trinidad in the Pitch Lake, because it is also found in carbonaceous material, on a hot day you would have PAHs; from domestic heating, from the exhaust of motor vehicles and from waste incinerators.

Also several industrial activities generate PAHs, which include the aluminium industry, the coke industry, gas, asphalt, iron and steel plants and in the transportation industry as you have heard earlier on. Other activities that use those materials from organic matter, like coke, coal, pitch, asphalt, diesel and heavy oil, all generate Polycyclic Aromatic Hydrocarbons (PAHs).

What are the health effects of those PAHs and why am I talking about those PAHs? Like I said, they are known cancer-causing agents and there have been studies done in the aluminium industry including the study described above. This was a study done in Soderberg plants in Canada from 1950 to 1979 and the study reported an excess risk of lung and bladder cancer. Several companies and several countries repeated the same study and made similar observations. The study was repeated in North America, Norway, Australia and in different parts of Europe, in France and Italy.

Other studies have also reported increased risk of kidney cancer and pancreatic cancer. However, these studies did not only show that there was increased risk of some of these cancers in the population over a worker lifetime, they were also able to show which workers doing what tasks and to what levels of exposure to Polycyclic Aromatic Hydrocarbons were developing the disease and which workers were not developing problems.

What I want to hammer out here is, it is not just the presence of a known hazard in the workplace that people study; people also try to understand what levels, what are the rates of exposures and how these things can be controlled.

Just to give you a schematic background: every society has a background risk of cancer so anywhere you go in the world people do have cancers and the older people gets the more there is increased risk of getting cancer. When you have an external factor like

an industrial process it can increase the risk of cancer. Yes, industrial processes and factors like smoking and other issues can increase the risk of cancer in an environment. However, once we have a good understanding of what the causes are and what levels cause the disease, strategies can be implemented to actually return the risk to background meaning that by controlling risk exposures one can bring the risks down to background level. What are the strategies, based on the studies done that have shown increased risk of cancer in this industry?

This is mostly done through engineering. For instance, in the pre-bake facilities the anode is baked separately in the building and in the modern smelter this baking is through an automated process. You have people sitting behind glass screens using computers and when they have to do certain tasks they use personal protective equipment to prevent exposure to some of these fumes. In the pot rooms in modern aluminium smelters workers work in cranes that are contained in shields and the work practice is such that the exposure is minimized.

More importantly, one of the things we encourage in workers is that they need to be trained and they need to understand the risks of what they are working with. This is important because, as a physician, for instance, there is a high risk of HIV in healthcare workers from needle sticks. When I was practicing 20 years ago there were certain precautions that we were not taking, but with understanding that risk there are certain things that have been implemented in hospitals which any of our physicians here would testify to, including using gloves, holding medical equipment in certain ways and disposing of equipment in certain ways so that we do not get needle sticks as used to occur.

Finally, there is also ongoing medical surveillance of workers who have been exposed for several years to see if they continue to have the cancer risk that was previously described.

Just to give you a sense of what we are talking about when we are talking about the risk and understanding the levels of exposure that are known to cause risks, this is the data that was provided in one of the most concise studies done in this workforce. This table shows the risk of exposure to the chemical. The agent used as an indicator for this chemical is called BAP and you can actually measure levels in the workplace. This chart

shows that people who were exposed to 350 micrograms per cubic meter or BAP over a working life time had a doubling increased risk of getting cancer. Based on this knowledge business has been controlled to levels closer to zero to 10. What that chart is showing is that if you do not have any exposure you have a risk of one, which is a background risk and, as exposure increases, your risk increases. So currently there are controls in place to actually reduce one's risk closer to the background risk.

There have also been follow up studies done since the studies that I have reported and I would be happy to share the references to all the studies to anybody who is interested for their own independent review.

One of the more recent studies was recently done in pre-bake smelters in Victoria, Australia. Workers who were in this industry as far back as 1984 are currently under surveillance and there has been about two or three reported cases of intermittently every five to 10 years. Currently, there has been no excess increase risks of cancer found in these workers who are working with the more advanced technology in this same industry. This is published.

The other issue that has been raised is what is the risk of cancer in communities in the vicinity of an aluminium smelter. This is a very important question. As I said, PAHs are found everywhere in the environment and levels are higher in urban areas compared to rural areas. Just to give you an example, in a rural area—now we are talking about nanograms not micrograms—the typical levels of PAHs that one can find would be like from 0.1 nanograms to 1.2 nanograms on average in the air. However, in a city one could find levels as high as from one to 20 nanograms in the air. So, the older set of technology release more PAHs compared to the newer pre-bakes. There are other studies that have been published in the 1950s, 1960s, 1970s through the 1980s and the early 1990s in Canada that have shown that some of these older smelter boxes can have levels as high as five nanograms in the air. Therefore, levels of PAHs in communities around older smelter boxes could be as high as five nanograms compared to a background of about 0.1 or 1.2.

However, it is also important to know that the levels of this chemical, as with most chemicals, at the boundary of the facility—that is part of the reason for having a buffer zone—is what is most important and not necessarily the size of the whole area.

There are actually methods to measure these chemicals at boundaries of facilities and one can then use that to determine if there is an increased risk. So, the levels that are found at the boundaries of facilities are much lower that what one would find in the workplace.

One of the things I was asked to do was to report on the studies done to actually see communities that were studied in the vicinity of smelters. This was one study that was published in 1994. It was a Norwegian study that was done around the vicinity of four aluminium smelters. The incidents of cancer in that population from 1960 through 1991 was abstracted from the cancer registry and then the national average rate of cancer expected for that population was determined. The conclusion was that the incidence of cancer in those communities in the vicinities of these smelters were no different than what was expected using the national average.

As other speakers would talk about, there are actually safe air limits of PAHs that have been developed by many agencies and regulatory agencies. If this PAH emission is kept below the safe standards at the boundary of the facilities then the community should be safe. Just to give you an example, most of the countries in the world have established standards ranging from 0.1 to one nanogram as a community safe level. This is the level that has been determined to cause less than one extra case of cancer in a population of about one million people. If one uses the kind of modelling that was talked about and the fence line level is less than one nanogram, then one would expect to see less than one extra case of cancer in that population.

This could be achieved by an emission controls using appropriate technology, which I would leave for the engineers and others to talk about how this is achievable.

The other main health issue that has been discussed is fluorides. As you all know we have fluoride in water and we have fluoride in toothpaste. Fluoride is put in water and toothpaste to strengthen our teeth, prevent decay and to strengthen our bone. However, too much of anything is bad and too little of anything is bad. Exposure to high levels of fluoride can cause two problems: one is fluorosis, a condition that causes discolouration and muddling of the teeth; and the other is irritation of the airways and asthma.

There have been studies that have shown that fluorosis occurred in smelters and in fertilizing plants as early as 1932. However, a study was actually published in 1963 that

showed the dose-response relationship. People who were exposed to 3.8 milligrams of fluoride over a 40-year work life were at more risk of developing fluorosis. Based on this information different agencies in the world established a safe limit of 2.5 milligrams and below. Since then about two or three studies that have followed these workforces over 20 years and they have not reported one case of fluorosis among workers who are currently being exposed to these low levels.

I looked for evidence of fluorosis reported around aluminium smelters in communities because that is another one of the concerns, and I only came across two case reports. One was in China in 1981 and in Russia in 1993. I could not interface either report. However, I was not able to see any reports of people in communities in the vicinity of smelters developing fluorosis in Europe, North America, Australia or South America. Given the kinds of levels—the 2.5—has been shown to be safe in workers, and the kinds of levels that one would expect at the fence lines—I am talking about micrograms now—almost 1,000 and others have placed it lower, fluorosis is unlikely to occur in the vicinity of a modern pre-bake smelter.

The other problem that has been described in workers is asthma. Indeed, there continues to be a modest increased risk of asthma among workers from exposure to lower levels of fluoride. Part of the reason was that the standard was implemented to prevent fluorosis, however, even though the risk of respiratory diseases went down, there continues to be a slight excess increased risk. Based on this information measures to prevent fluorosis does not necessarily prevent asthma. No exposure limits have been implemented in different parts of the world including Norway and in some companies to prevent respiratory diseases among workers. I did not see any reports of increase to risk of respiratory diseases in the vicinity of pre-baked smelters.

Just to conclude, though, I believe that asthma and other respiratory diseases can be prevented in the vicinity of a modern smelter by controlling the fluorides, the SO2 emissions using low emission technology designed to capture and recycle most of the emissions and having an adequate buffer zone. People have got to be sure of buffer zones. Indeed, there is a need to have that space between the facility and the people so that whatever emissions can be managed on the property of the facility.

So, I would conclude that it is not an all or none when we are dealing with occupational and environmental medicine. We identify diseases, we study these diseases, we try to under the dose-response and then we implement methods to reduce the risks. I believe the successful control of health hazards can be achieved in a properly run modern aluminium smelter. If in the workplace we have the modern technology, appropriate engineering, proper use of personal protective mechanism and ongoing monitoring of the workers; and in the communities you have controls that can reduce the emissions below established standards, and, more importantly, ongoing monitoring and audits of the air, water and soil to make sure to make sure that what has been predicted by the model and what has been proposed in the design has actually been carried out when such facilities do operate.

Thank you.

Mr. Chairman: Thank you, very much, Dr. Taiwo.

I do not know if we were successful in establishing contact. [*Pause*]

Mr. Mikey Matthews: Mr. Chairman, why do we not give consideration to the discussion? We have not had a discussion here this morning. It is quite a disappointment and I think we have eaten away a lot of time and the symposium is yet to come alive.

Mr. Chairman: Well, yes. The only point I wanted to make, if we could not establish telephone contact, was to say that we have received copies of the presentation and they will be emailed to all delegates; and hard copies will be made available. They would also be posted on the website of the South Trinidad Chamber of Industry and Commerce, so you can have access to it. Actually, the next item on the agenda, just after the tea break will all be devoted to presentations and discussions.

Mr. M. Matthews: I think we can suspend the tea break as well. And, if you would permit me, I would start the ball a rolling, Sir.

Mr. Chairman: Did you have any written questions?

Mr. M. Matthews: No, we all can speak, we have tongues here.

Mr. Chairman: Okay, two things. Maybe I can ask, by a show of hands, those of you who want to suspend the tea break.

Mr. M. Matthews: We can have tea while we talk.

Mr. Chairman: I think we were looking at a 10-minute coffee break so somebody can grab a refreshment or visit the washroom. That was the idea. I know some of the younger delegates are a little more robust in some regard. So, why do we not just take a 10-minute break—

Mr. M. Matthews: We do not want any break, Sir.

Mr. Chairman: Let us break for 10 minutes and you would be first on the agenda when we return.

Mr. M. Matthews: I am not talking for me, Sir.

Mr. Chairman: What is that?

Mr. M. Matthews: I am not talking for me, I want to speak for the people here.

Mr. Chairman: Yes, of course, but we have a programme and we are going to give you an opportunity to speak within the next 15 minutes. Thank you, very much.

Suspended at 4.20 p.m.

Resumed at 4.35 p.m.

Mr. Chairman: First I would like to make the point that we have received several dozens, maybe, close to 100 separate questions and requests for statements. Therefore, we are quite pleased with the level of interest, enthusiasm, contribution and participation by members and delegates. However, you will appreciate we just do not have the time this evening to allow every single question to be asked and responded to. What we have decided to do is to post all questions and comments on the STCIC website and therefore give all participants and any member of the public an opportunity also to provide feedback that can be shared by all interested parties, including all our delegates.

Mr. Gary Aboud: Mr. Chairman, could we postpone these proceedings until 6.00 p.m. to allow more transparency in response to questions? We have the panelist here today, would it not be better if we postpone? This is a very pressing matter in which public gas is being given away and the public health may be jeopardized. Could we postpone the closure of the meeting to 7.00 p.m. if necessary?

Member: You mean prolong the meeting.

Mr. Chairman: Let us continue. We have several questions and comments that we would now entertain and we would have a look at the time as we go along.

The first request to make a comment is by one Father Moses—I do not know if he is still here—from the Inter Religious Organization. I would again entreat you to limit your comments to a maximum of two minutes so that we can get as many comments and questions as possible this evening.

Father Michael Moses: I just wanted to respond to the Associate Professor and also to our brother from Norway.

There is a recent study, March 29, 2006, in the journal, *Cancer Causes Control*, Cancer Risk in Aluminium Reduction Plant Workers, Canada—a 29 years study up to 1999. Now, they will say this is not the pre-baked, but is our brother aware that Occupational Environmental Medicine Journal, 1995, Runningburg and Anderson, Mortality and Cancer Mobility in workers from an aluminium smelter with pre-baked carbon anodes. It says the results support previous findings that exposure to coal tar pitch volatiles in the aluminium industry has been associated with increased risk of bladder and lung cancer. They also had information suggesting that exposure to tar in this smelter has acted on early stage in the development of these cancers followed by a latency period of 30 to 40 years.

Now, the thing is, what we really need is an independent body of scientists because this took me a few hours of research and this really backs up my work with Dr. Chang Yen and is an appendix to Prof. Spence's presentation. I am saying we need an independent body of scientists because there is a lot of research, pro and con, and we need to look at the primary research material and realize we have problems. We are talking about 1995 to 2006 research and a lot of the times it depends on who is interpreting these independent studies, so I think we need to look at that.

Also, very quickly, the independent Wagerup Refinery Unit III expansion in dependent members of the Wagerup medical practitioners forum, Professor Holeman sent me this—I think this is very important to hear—where it says that the evidence arising from earlier studies clearly indicates—that is Wagerup**,** Australia; it is a refinery, but it is the same thing—indicates that the geography and topography of the area was never suitable for the placement of an aluminium refinery, which they want to expand, and the history of workers at the existing refinery in our professional opinion shows that a

number of workers have suffered acute chronic and adverse health consequences as a result of working at the refinery.

That is why it is important to have an independent study of scientist; the Ministry of Health must do a proper base line survey; you must empower the EMA with proper laws and funding.

Thank you.

Mr. Chairman: I do not know if Dr. Taiwo has a comment.

Dr. O. Taiwo: In my presentation, remember I had 20 minutes to summarize, I clearly stated that out there, there was increased risks of cancer and at that the same findings were duplicated in other studies, like the one you discussed. Those studies were also done over the same span. I have the paper with me and I can discuss it with you. I think the key point here is that we can take each paper and debate back and forth, but the most important thing is that these studies by these same people who did this study have all but summarized in what is called the met analysis, that they have connected together to determine the dose-response. So, I am not saying that there is no cancer risk in this industry, what I am saying it that: one, the cancer risk is low; the root of exposure is not well understood and the levels that are considered safe are well understood. Secondly, I restricted my comments to a smelter, and a smelter is very different from a refinery. I think it is very important to know that there is a difference between the smelter and the refinery. Referring to health issues in a refinery in the context of a smelter can be confusing and misleading.

Thank you.

Mr. Chairman: Thank you, very much.

I think you may have also indirectly answered one of the questions by Anya Dardeen of the Trinidad Youth Council where she was asking:

> Are you aware of any scientific studies to determine the relationship between smelters and respiratory diseases to persons living in close proximity to smelters.

I think you seem to have addressed that issue in the general health population.

Dr. S. Smith: I would like to comment on Dr. Taiwo's presentation. Now, first of all I would like to comment on the volume of emissions, of which he omitted one or two

emissions. There are mixed solid wastes that are released into the environment from a smelter and with a release rate of 40 to 60 kilograms per ton of mixed solid waste we have both smelters releasing 18,000 to 27,000 metric tons per year of mixed solids into our environment. For the spent cathodes 50 per cent comprise factory materials, 50 per cent carbon impregnated with silicone oxides and at 16 per cent of the lining, that works up to 2,982 metric tons of silicon oxides released into our environment every year.

Of the fluorides which comprise 34 per cent of the pot linings, we would have 6,337 metric tons released into our environment every year. Cyanides will comprise 400 parts per million and six to 12 kilograms per ton of hydrogen fluoride, we will release about 6,000 metric tons per year. And, if we use the best industry standard of 0.01 kilogram per ton per year of polynuclear aromatic hydrocarbon we will be visited with 1.25 metric tons from Alutrint and 3.4 metric tons per year from Alcoa. Now, that is no small quantity of release.

With respect to the spent pot-liners, Alcoa has created guidelines and they have stated that because the spent pot-liners contain only leachable cyanides and fluoride it may, if not managed appropriately cause contamination of soil, surface water and ground water during removal, storage, treatment and/or disposal. They themselves have recommended that concentrations of hydrogen and methane must be maintained at less than one per cent because it constitutes an explosion hazard. That is for the spent pot-liners.

With regard to the fact that PAHs get into the environment, Dr. Taiwo, was commenting that the workers are exposed to PAHs but also the counties in which these smelters occur. For example, in Norway, Australia and in the Unites States there have been tremendous geographic clustering of cancers in the North Eastern United States and the Western United States to the extent that the state requisitioned studies to be done on the clustering of breast cancer in North Eastern United States where there is heavy contamination by PAHs.

The breast tissue is induced by DNA adducts formed by the PAHs and their interaction with the human genome. They are not only genome toxic but they change your genome**.** It is little wonder that in most industrialized countries you will find that where there is an excessive amount of PAHs in the environment you have cancer and

heart diseases as the top causes of mortality in those societies because they are both arterogenic as well as carcinogenic.

Mr. Chairman: Thank you, Dr. Smith. Mr. Keul, you wanted to make a comment?

Mr. Erik Keul: Yes. There was an extensive study carried out where some of the smelters have been in the same location for over 70 years. As previously announced there has been no correlation between cancers due to exposure from the smelters on the population in Norway in general. There has been a ban on the smelter which is in the narrow or fine particles in the population but it has not been properly correlated that this could cause cancer but this is a smelter in a very narrow alley where all the emissions remain in the alley and there is no ocean to flush it out overall, plain lands. The study called the "Effect Study of Aluminium Smelters" and it is available.

Mr. Chairman: Thank you very much. The next question is from Mr. Bill Ramrattan of the Association of Professional Engineers of Trinidad and Tobago and I think it is directed to Mr. Saith. It says: What type of planning exercise was done to choose these sites?

Mr. Mikey Matthews: Let the people speak.

Mr. Chairman: Yes, Sir. Are you Mr. Mikey Matthews?

Mr. Matthews: Yes.

Mr. Chairman: Okay, you will get an opportunity shortly.

Mr. Matthews: I am not speaking about myself; I am talking about leaders; everybody should speak.

Mr. Chairman: We cannot all speak at the same time.

Mr. Matthews: Everybody does not have to speak. People speak through their leaders; and we have a few people here to speak; everybody doe not have to; there are people who can speak for me. Let us move on. We fed up hear the panel; they are boring everybody.

Mr. Chairman: Okay, you will get your opportunity in a moment. Who would you like to speak on your behalf?

Mr. Matthews: Just open up the meeting and let people speak.

Mr. Chairman: We need to have some order, young man.

Mr. Matthews: Open up the floor. We do not want to hear any panel; we are fed up of them.

Mr. Chairman Okay, thank you for that comment. M. Saith.

Mr. Prakash Saith: The choice of any industrial site goes through about four different phases. The first thing that we have to recall is that the existing Point Lisas Industrial Estate is filled to the maximum and if we want to attract new gas-based projects we have to find a site for them.

We have 10 criteria which we look at for any industrial site: First, the site should be a large contiguous parcel with a minimum area of 1,000 acres because we need to bring large quantities of water, power, gas and to build a port. The land use should be preferably zoned for industrial use; if that is possible. There should be affordable guaranteed reliable supply of bulk utilities or they should be readily made available to the site such as water, power, gas. The site should be in proximity to existing deep water harbour or an area that can be developed into a deep water harbour. The geological setting should be suitable for locating an industrial estate. The geotechnical properties of the site should minimize construction costs. Topographical conditions should minimize engineering and earth works. The site should have a minimum negative environmental and social impact. The site should have minimum occupancy and encumbrances. The site should be fairly easy to acquire – preferably State-owned.

After we use those 10 criteria we identify sites. Now, for those who know Trinidad, the north coast is virtually out because of several factors. That area is mountainous; it has unsatisfactory road networks and it is also unsuitable for port development. The south coast is virtually out; Prof. Spence talked about an anti cline there which makes the south coast unsuitable for building because there are strong volcano activities on the south coast. Also, gas has been bundling up there. The ocean currents are also very strong for putting a harbour there. The north and east coasts are exposed to strong winds and waves by the Caribbean Sea and the Atlantic Ocean and requires costly break water. The west coast is very sheltered. When we are looking at industrial estates we have to keep away from protected areas such as the swamps, forest reserve areas and so on; so that limits us to where we go. The sites we have identified, we have touched none of those.

After we identify sites we take it to the Government, show the pros and cons and then they decide which are the sites we should go at based on the pros and the cons.

After that we engage external consultants to do detailed geotechnical, environmental and geological studies to approve of the site. Once the site has been approved, we go to the fourth stage which is designs and EIA and that is the stage we are in for most of the sites right now. Thank you.

Mr. Chairman: Thank you very much.

Mr. Gary Aboud (*Fishermen and Friends of the Sea***):** Is it that Prof. Kenny was misled and that everything that Prof. Kenny said is nonsense? Or is it that we just listened to a member employed by the State speaks in a symposium about the lawlessness of the State? I think the latter is the truth, especially since I am fully aware that the Chairman of LABIDCO is Mr. Prakash Saith. Is that correct, Mr. Saith?

Mr. Prakash Saith: You are very wrong?

Mr. Aboud: I am wrong. Is it the NEC you are the Chairman of?

Mr. Saith No, Sir; you are very wrong again; try again.

Mr. Aboud: I am aware of an application made to the EMA for the development of a port in La Brea and after the EMA issued the terms of reference for the development of an EIA for 15 hectares of reclaimed land for the development of a port in La Brea, the application was withdrawn, and a few days after the withdrawal of the application, the application was approved; and the application was made by Mr. Prakash Saith. Thank you.

Mr. Chairman: Thank you very much, Mr. Aboud. I now call on Mr. Matthews if he wants to make his comments. I would ask if you can limit it like everybody else.

Mr. Matthews: I gave way to the lady.

Mr. Chairman: Okay, sure.

Miss Anita George (New Village Village Council): I sat here all day and I must say that I was impressed with some of the persons who spoke; and some has left me none the wiser. Seeing that these people are there, they might be able to give me some answers. We heard about the medical risks of cancer, respiratory diseases, and heart problems. I asked last week or week before in Alcoa when I went down there and I did not get any answer but I hope today I get.

I want to know should in case the plant is built, if there would be an independent survey on the persons who are in the ten to fifteen miles radius medically and after two or

three years if there would be a follow-up. If we see those problems arising within that time we would know definitely it is from the plant. One person told me that he will not take liability alone because there are other industries but we are dealing now with Alcoa. Who would be liable? Who would you be able to sue? *[Applause]* Tobacco companies said tobacco was not dangerous but now millions of dollars per day tobacco companies are facing. I am asking again: to smelt or not to smelt?

Right now, I have no decision because I want facts. I say to the Government, if there is excess gas, why not serve it to the households as is done in America? If you want something to do with the gas, put it in the households and let us pay for it. I want to know what is safe. Should an accident take place in Chatham – I live at New Village – what radius would be safe?

The water in Chatham and New Village is supplied by Chatham. Seven or eight weeks you do not get some water. I want to know what would become of our water system. Will it be polluted? Are we going to lose another beach? We have lost Clifton Hill; we are going to lose Chatham and we are going to lose Vessigny or La Brea. I am dissatisfied and I want the people in authority to know that you only reign for a period of time. Birds fly but they come down.

Mr. Chairman: Thank you very much. Mr. Goddard.

Mr. Glenn Goddard: I would like to make some points in response to that last statement in terms of the EIA process. I am happy to hear that you are depending on information on which to make a decision. The EIA process would speak to issues. The risk of any accidents and the places that will be affected by those accidents, including the populations around as well as ground water and other natural resources will have to be evaluated and the extent of it determined and the EIA and the safety process will determine whether or not that risk is something that we need to be concerned about before we can move forward with a decision.

Regarding the beach, that is very important. Prof. Kenny talked about the breaking up of the applications. It is not part of Alcoa's application; we have a separate application for a port which we are very concerned about. We have a port being proposed that has a four kilometer or so dredge channel coming into the facility and that has significant implications in an area where the coast is already under some threat; that

has ports upstream that may be causing some problems. It is something we are looking very closely at in that application and having significant studies to try to make sure that no further deterioration of that coastline takes place; and that is an opportunity we did not have at Clifton Hill because of when that project was approved.

With regard to Fr. Michael Moses' discussion on independent scientist to look at issues, on the issue of environmental issues; issues that take place outside the plant I guess the EMA had hoped that between us and our consultants we could provide that kind of expertise. We have listened to you during our public consultation process. Many people have said for various reasons they feel that an independent facilitator or independent expertise may be required. We have heard you and our terms of reference for Alcoa calls for bringing in independent experts to join the process - you should be seeing them and hearing more about that soon - to help people make a decision on the environmental issues. I just want to separate the worker issues and the environmental issues that we have jurisdiction over. I just wanted to make those points.

Mr. Chairman: Thank you very much.

Mr. Anil Roberts: Mr. Chairman, Anil Roberts, Food Crops Farmers Association. Mr. Chairman, I will be very quick because I have enough time on the radio to talk but it was just interesting to know that out of 100 pieces of paper, you somehow found a question that Mr. Prakash Saith was prepared with a document in front of him to read. That is either a great coincidence or brilliant planning. *[Applause]* Let me move on. Let me just make one or two statements to Dr. "Kill"; is it Dr. "Kill"? How do you pronounce your name, Sir.

Mr. Erik Keul: "Keul"

Mr. A. Roberts: Or, sorry. Everyone else here, all the scientists have agreed that the new technology, the pre baked is a bit – that is what we are discussing - and the old thing, everybody admits it is bad but he is sitting down here in the Banana Republic of Trinidad and Tobago to tell us that in 70 years there is not a case of anything in Norway. Dr. Keul, I have nothing further for you.

Dr. Taiwo, it was brilliant how you came, you let us know that you were sponsored by Alcoa; thank you very much. You mentioned new technology, work practices, protective gears for our Trinbagonian people and monitoring of the smelter

plants. Dr. Taiwo, why did you not mention the smelters, salt or fresh water, that cost US$200 million, is that not important to keep us safe? Or is it that it is not that important as US$200 million for Alcoa? You do not have to answer.

I have a quick question for Mr. Goddard. If the smelter plant or if smelters in general receive a Certificate of Environmental Clearance from the Environmental Management Authority, please, give me one example of an industry that will not qualify? Mr. Goddard.

Mr. G. Goddard: I think you have made your point.

Mr. A. Roberts: No, I am just asking; I have not made any point, it is a question.

Mr. G. Goddard: There is a process to be followed.

Mr. A. Roberts: Okay, well I have made my point.

For Mr. Prakash Saith; Good Evening, Sir; it is very nice to see you in person for the first time even though I have been a citizen of this country for 37 years. In the Memorandum of Understanding that you signed with Alcoa a few years ago, what was the price of gas that you negotiated and what regime over the 20-year/30-year period was negotiated; was inflation tagged on to it; what sort of figures are we talking about? Did the Memorandum of Understanding include a commitment from Alcoa to go downstream; or is that a new paper that we are trying to shuffle? Thank you.

Mr. Prakash Saith: Thank you very much, Mr. Roberts, for your kind words about my planning ability. Yes, I came to talk about selection of sites; that is why I walked with that paper. Getting back to the price of gas; that Memorandum of Understanding that was signed, that has since expired, with Alcoa; I think it was signed in 2004, there was no price of gas in it.

Mr. Chairman: Thank you very much.

Mr. A. Roberts: I am talking about the downstream. In that expired Memorandum of Understanding, when you signed it, did you make Alcoa commit to downstream? Are they going to give 25% to the Wallerfield where UTT and eTeck are designing? Or, is that going to be in the new one? Since the old Memorandum of Understanding has expired, can we have a copy, please?

Mr. P. Saith: I am not at liberty to give you a copy of that. I believe that the new Memorandum of Understanding with the Government speaks about downstream

industries for Alcoa. I think the Government has made it very clear to Alcoa that if they do not go downstream there would be no approval for their project. I think that had been made very clear to Alcoa.

Mr. Chairman: Thank you very much both Mr. Roberts and Mr. Saith.

Miss Tazia Abdool *(Chatham Women's Group)***:** Good Afternoon, Mr. Chairman, members of the Head Table, Ladies and Gentlemen. I am Tazia Abdool. I am a Form IV student at Naparima Girls. I am also a resident of Chatham. I am representing the youths of the Southwestern Peninsula.

We are told very often at school, at camp and wherever we go that you can be whoever you want to be and you can choose your own destiny. I think – and please correct me if I am wrong – that this is very much applicable today in this situation. We can talk about profits and jobs and whatever else but the fact of the matter remains that the victims, the receivers of your decisions, do not want an aluminium smelter as their destiny. The people that you all expect to compromise their land, houses, history, lifestyle and livelihoods have nothing to gain; they have everything to lose; and for what? Not a school; not even a playground; nothing that will enhance their lives; only to destroy it. Drum role please Alcoa and aluminium smelter.

I want to note also - and I know it was said before but I would like to repeat it – that those residents who were told that they have to move have not been told where they will be relocated and under what conditions. For example if you are used to the conditions I am used to, you would be living on half of an acre of land with lots of trees and a proper house and everything. The land that I live on, my forefathers, my great, great, great grandfather walked on this land and toiled on my parents' land; I do not know if you would be able to give me back that history; can you? Anyway, what do you have to lose? If I presume correctly, you have nothing to lose.

Therefore, Ladies and Gentlemen; you great minds and noble leaders, you should allow the democratic process to take over and allow those affected to decide what their future should be; let them choose their destiny.

If the Government gives the public that freedom, then and only then would this Government be a true, kind, caring and concerned one as they claim to be. Why not seek

to use the residents as pillars? Work with the population to enhance and support their present lifestyle and livelihoods. That is true people-based development.

I just have a few closing questions. Mr. Prakash Saith, you said that we would want to attract more gas-based industries; I ask: why do we want more gas-based industries? Feel free to respond now.

Mr. Prakash Saith: Sure. Right now, as you know, we have ammonia, methanol and in those pipelines, the prices are what you call "cyclical" - sometimes they are up; sometimes they are down. What the Government is trying to do is diversify the products that we make from gas; so that when the methanol and ammonia prices are down– and they all tend to go down at the same time – the other products that we have – not petrochemicals – the prices would be able to sustain the standard of living that we are accustomed to.

Miss Abdool: Okay, I just have a suggestion, my humble view. Can we diversify outside of gas-based stuff; like go into agriculture and tourism; you know, make those sectors bigger?

Mr. saith: Oh, sure; that is a very good idea. I work in the gas industry and I try to develop the gas industry. There are people looking after agriculture and so on; and it is their responsibility to do that. But, hopefully, the money that we get from the energy industry can be used for agriculture and other things. You know, you need money to do all this diversification.

Miss Abdool: Okay. This question is directed to anyone who can answer, probably one of the outgoing officials. I cannot remember if it was Mr. Prakash Saith or Lenny Saith but one of them said that the process needs no water. I am not sure about that but could somebody clarify that; if the process requires water? Could somebody please answer if the motivational phrase - the motivational phrase that I quoted earlier: you can be whoever you want to be, you chose your own destiny – if it is applicable in our situation for our nation?

Someone asked me to present this question: What other sites were considered and evaluated for an aluminium smelter? Thank you. *[Loud Applause]*

Mr. Chairman: Thank you very much.

Miss Ayana Jardaine *(Trinidad Youth Council):* I want to commend the young lady because we understand her pain. One of the things is that democracy is supposed to protect the weak. What some of us are saying is we are not looking at you selecting an independent group of scientists, we are saying that the NGOs that are interested in these issues, that have special concerns, let us be the ones to select independent scientists and the Government will pay for it because it is the Government that wants the smelters.

One of the issues we had is that by March 2007 we would have the final EIA; is that correct? That is a bit crazy; is it not? He just mentioned that South Africa had two to three years of consultation; and here it is, in Trinidad we are now starting and in three months' time it is going to be over? We are talking about a national consultation, not a piecemeal where you start off in 2004 and you tell people what you want to do. It is more what I spoke to Alcoa about, I had a big problem with that because the concept of consultation is information-giving; and that is not so; consultation is a two-way discourse between people and the people who are the panelists. Please, if we have to do this thing let us do it properly; let us take the time to do the research that is required in a transparent way. Thank you.

Mr. Chairman: Thank you very much. Let us try to keep to two minutes so that we can give as many participants an opportunity.

Mr. Clive Nunez: I followed the procedure and I sent two questions in writing but I felt they will not be put so I was waiting. Anyway, I want to know what is the objective of this symposium? The reason for that is up to yesterday the Prime Minister said smelter. So, what is this about when we were told by the very Prime Minister on the basis of the resistance that was building in the country that it was time for a public symposium. Do you know what he said further? "Coming out of the symposium if Government had been making a fundamental mistake, then they would correct that". But he continues to say smelter because he said very early it was a done deal. As Chalkdust says, "when money pass". *[Applause]*

I am concerned about the health and all that but I want to know whether the siting Alcoa proposed – where they want to site it – whether it is a rouse so that the United State of America, based on the line arm of their Homeland Security, will be able to justify

a military base on the Southwestern Peninsula, dealing with their plans for Venezuela and the whole development in Latin America.

The other question was, if we shall have one, two three or four smelters, or three down in southwestern Trinidad, and everybody knows what is happening with global warming—everybody knows what is happening with abnormal weather conditions and all kinds of things—and a hurricane of enormous proportions, like Ivan or worse, should devastate these plants how are we going to be affected; not only Trinidad, we are dealing with the region now. Then, we are also dealing with if we have the smelter and we are putting the spent pot-lining down into the ground where the thing is so dangerous that there are certain specifications for having it down in the ground—how the walls have to be about three or four feet—that tells you something.

Then, when you are ready to move it from Trinidad a number of countries in the region refuse to give the okay, under the Basel Convention, for it to pass in their territory, waters or whatever. You see the kind of position? I now understand why Alcoa is not up on the platform, because Alcoa has a lot of things to answer that none of them there can answer; probably the closest one is Dr. Taiwo. These are important questions that we must—whether we come here and waste a whole day, because I remember from very early the Prime Minister said protest or no protest, it is a done deal. Tell us if they bring adults here for a done deal. Somebody should be able to answer. Maybe, Prakesh Saith, I do not know.

Mr. Chairman: Thank you, very much. I think the forum is achieving many of the objectives that the Chamber has set out which is really the sharing of views, bring expert opinions to the table and to give all of us an opportunity to have our say and share our opinion. So, I think, from that point of view we are, in fact, achieving our objectives.

Unfortunately, I was not at the DOMA meeting yesterday and, therefore, I cannot say exactly what was said by any of the parties. What I can say is that I had a glimpse today of the newspaper and the quotation that was there, that was ascribed as being spoken, I could not glean from that any direct mention that smelter was a done deal. I did not clearly extract that from the newspaper.

Mr. A. Roberts: Mr. Chairman, order, please. You just admitted that you did not hear the speech, Sir, so please do not try to comment on something that you did not hear.

Mr. Chairman: All I am asking is for all of us not to jump to conclusions if we were not there and actually heard the words of the speakers.

Mr. Roberts: But you are doing that, Sir.

Delegate: I heard his voice over the radio.

Mr. Chairman: As I said, we give everybody an opportunity to have their piece, okay? So, let us respect everybody's time; someone else has an opportunity to speak. Yes? Identify yourself, please.

Ms. Petra Bridgemohan [*Cedros Peninsula United*]: I keep hearing the deals that we cannot be privy to as citizens of the Republic of Trinidad and Tobago. I do recall, while sitting as Director on Transparency Local Chapter we signed an initiative called the Extractive Industries Transparency Initiative. In that the government, represented by Sen. Christine Sahadeo, gave an international and public commitment that the oil and gas revenues, along with every other mineral rights—because this is an international treaty—would be declared to the peoples of the world. While the treaty had its origins in the South Saharan mineral rampage that was going on, it applied and Trinidad and Tobago ran post-haste ahead to say that they would be first and foremost to ensure that that process is well adhered to. Yet, here we stand, practically a little one year less, and we have a government that is refusing to release to Parliament, the highest level—I want to remind the panel and Mr. Saith, because you are your brother's keeper, as it were, and Mr. Lenny Saith is the current Minister of Energy as the former Minister of Energy is under charges at the moment. Let us remind ourselves that there is a public commitment by the government to release the information regarding deals made on behalf of the people of Trinidad and Tobago.

I was very impressed to listen to the comments from Mr. Collin Pratt on the economics of the aluminium industry. One of the things we, as activists, have become are Jack of all trades, masters of none. I have had to spend quite a fair bit of time watching the consolidation of the Russian aluminium industry, the Chinese aluminium industry, the Middle Eastern aluminium industry and I am thinking to myself, it is not that we need it, why are we killing ourselves for it.

So, when I heard Mr. Pratt make the comment—Mr. Pratt, I am not an economist, I am sure Prof. Pantin will clarify later on—that even if we ran the Alutrint and Alcoa

smelters we would be touching less than one per cent of global production and that we are, in fact, dealing with a cyclic aluminium market which, at the moment, is not operating in our best interest—best interest for me being Trinidad and Tobago citizens monetizing our reward.

One of the issues that came out of the Joint Select Committee of Parliament hearing—I would like all our invited guests like Mr. Lochner who has had the benefit of a democratic process in South Africa to get his plans through; and Mr. Keul of Norway, where Norway runs to a referendum on national issues; Mr. Pratt who is British would know although referendum is not mandated in the UK constitution on matters of national interest especially things like EU and economic monetary unions, they run to a referendum.

So, I cannot understand why today I sat at a symposium, sponsored, supposedly, by the government and most of the speakers of foreign input, seem to be very cautious about the need for an aluminium smelter. The economics that we were presented with by Mr. Pratt—as a matter of fact and in answer to Mr. Roberts question of whether we need an aluminium industry; I am paraphrasing it globally, but "like a bullet in the head", basically, is what he said, because we have maximized everything.

Now, I have had the opportunity to read through the master gas plan for 2002. I do know that the aluminium industry is one of the final components of that master gas plan. But, we would be less than visionary to stick with a concrete plan in view of the changing economic and environmental concerns facing the world. Just in case our so-called visionaries like Messrs Saith and Julien and Alcoa—because Alcoa comes from a country that does not uphold the Kyoto Convention so that its big boys can make as much money from gaseous emissions as they want—to know that there is such a thing as the Stern Report by a well know economist out of the United Kingdom. Even the economist has finally adjusted to the truth that economic sustainable development must take into consideration the environment and health. We have looked to the European Charter; we have read the reports from the United Nations on the impact of foreign direct investment in Sub-Sahara, Africa.

While I appreciate what Mr. Lochner was giving us in terms of the African experience about the smelter, we have to understand the picture in which he is working,

compared to what we are working in. We are working in a small-island state with a full economy where all our industries are operating fairly maximally. We can afford to diversify to non energy bases and I cannot understand why, for the life of me, we have a government that is pushing ahead on an economic route that is surely going to create a "Haitidom" for this country. We are talking about resources that we cannot replenish.

As a matter of fact, let those who are destroying it note they did not build it; they did not create it; they have no right to it. Furthermore, we are watching a population for the first time in my life, as a citizen of Trinidad and Tobago, independent Trinidad and Tobago—I have watched a movement grow from the ground up. This is not a movement that was started by the Government. This is a movement of concern that started from the villages of Chatham, Union, La Brea and Cedros. We have listened to an economic discussion this morning and I have not heard a single member of the panel present us with a reason that sounds so great that we could turn a blind eye to all the other damage and impact.

So, is it a case of fools rush in where angels fear to tread? Because Mr. Manning is definitely not going to be getting an angel as far as I am concerned. I would like Mr. Saith to remind people that as his brother's keeper there is a very questionable conflict of interest going on here. The Kenny J**.** report which outlined—which the Chatham CEC says was the basis for choosing Chatham, was never appendixed to the CEC for Chatham. How can you present a report for choosing a site and that report is not attached to the CEC application that went to the EMA? Everything about this particular project from start to finish leaves us in no doubt that we are watching a government that is wanting to push its views. Again, this is not good governance, it is not transparency, it is not accountability; it is not openness. Therefore, I say, as we were told at the beginning of this fight, as it were, from the international people who have fought smelters in their country, if the government does not listen, then the vote is the only thing, remove them.

Thank you.

Mr. Chairman: Thank you, very much.

Mr. Fitzgerald Jeffery: [*La Brea Core Group*]: I want to start by making one statement. In 1998 when the then Prime Minister, Mr. Basdeo Panday, signed the agreement for an aluminium smelter to be put in Point Lisas, I wonder where were the environmentalists.

More than that, the period 1978 up to the advent of the Labidco Union Industrial Estate, was a period of great depression in La Brea; high unemployment, commercial activities were almost at a standstill; the large number of Chinese businessmen migrated out of the area. We recognized, as well, that shoe stores pharmacies went out; drugs and prostitution were on the increase. My dear friends, we also recognized that the drop-out rate in our schools went up; the academic and technical performances of our students went down. My friends, it was a sad period in this La Brea region.

What we recognized is that with the coming on stream of the Labidco Union Industrial Estate, we have seen great hope. Right now we have seen the emergence of a number of commercial activities in La Brea. We see performance in our students have increased; the drop-out rate has diminished in La Brea. We see, right now, even the residential places are being renovated and so on.

My dear friends, what has happened is that La Brea is now on the upswing. This aluminium smelter by Alutrint will generate over 1,000 permanent jobs. I have seen our young boys and girls' shoulders are now erect; their self-esteem has increased and they are ready for the world of work that is ahead of them.

Not only that, my dear friends, when we look at the argument with this aluminium smelter we look at the Labidco Union Industrial Estate and we look at Alutrint and we recognize that the ambient air quality standards set by the EMA of one microgramme per cubic metre has been met by Alutrint at great cost. Therefore, this question about air quality standard is well within the reach of Alutrint.

Secondly, there is no aquifer under which you are going to find the Alutrint smelter. We already heard about the export of the pot-liners to the United States. And, we see already, my dear brothers and sisters, the emergence of people attending courses—even the middle-aged people are now doing courses to access the employment and business opportunities that will be created in La Brea.

What I am trying to say here, my dear friends, is that this aluminium smelter in La Brae is something that the people in La Brea desperately want. We know that contrary to what is being levelled outside, 90 per cent or more of the people of La Brea are behind this aluminium smelter. I cannot talk about anywhere else in Trinidad and Tobago, but

the people in La Brea recognize the importance of the aluminium smelter in La Brea. Alutrint smelter has met all the standards that are required.

Do you know what is sad? We talk about all kinds of diseases and so on, but you know, look at Point Lisas, nobody quarelling with nobody about Point Lisas; everybody is happy up there. What has happened? Businesses has skyrocketed in Central. We see here families who, once upon a time, did not have the opportunity to take their families out to lunch in some of those restaurants, they are now doing that twice and three times per week. They have cars and their homes are being renovated and so on.

We see what has happened between Chaguanas and California. They are laughing at La Brea, because they are now enjoying the fruits from the Industrial Estate. You know, the people of La Brea have learnt a lesson from that Point Lisas Industrial Estate. They can remember quite well, in the 1970s, when they were setting up the Point Lisas Industrial Estate, there was a lot of environmental concerns. But, what has happened? More industries went into the Point Lisas Industrial Estate and people became very silent.

I am saying we are quite prepared, let those who talk, talk. We want the aluminium smelter in La Brea so that what has happened in Point Lisas we can enjoy it down in La Brea.

My last question for the environmentalists is—we have to remember this thing because it hurts. Many years ago William Munroe wanted to set up the Spectrum outside the National Stadium. He was turned down. Do you know why? Because of the destruction of the mangrove; the ecology was going to be disrupted. But, what happened afterwards—now, I love Movie Towne, but the facts must be told. Price Smart, Movie Towne, Marriot Hotel came in the same area, not a sound was heard in opposition.

My friends, I am saying, enough is enough. As far as I am concerned, and the people of La Brea are concerned, the Alutrint smelter has met the requirements that are required and I am saying, let us go in peace.

Thank you.

Mr. Chairman: Thank you, very much.

Mr. Rikki Undheim [*Chatham Cap-de-ville Environmental Protection Group*] Good afternoon, ladies and gentlemen. This is a question that I did not really come to ask when

I came up here to the microphone, but because of my brother from La Brea is so convinced about the Alutrint smelter being such a good project for La Brea—I am not as familiar with La Brea as Chatham, I am a fifth generation Chathamite. This is a question directed to Prakash Saith and, maybe the guy from NEC, but it seems as though he has gone home. Has Alutrint ever built a smelter before and what kind of technology is Alutrint using in this new smelter? We know it is pre-baked, but is it Chinese technology?

If so, I was at the Joint Select Committee sittings and it was said publicly by one of your representatives—an understudy of you, I am sure—that the workers in the construction phase of Alutrint, as well as in the operational phase will be Chinese workers, the majority of them. And, the percentage of Trinidadians being employed in Alutrint, you guys could not disclose that to the Committee. But, that is beside what I really came here for.

I have come from a little village down south that, all of a sudden, is very popular. It is the most popular place in Trinidad and Tobago. It is one of the most beautiful places in the world. I know that because I have been very fortunate to be able to travel and see different places. Chatham was met by this monster about two and a half years ago. We were called to the government school—a school which attended and had my first interaction with education and learning to read and write—and there sat Mr. Wayne Hughes and some other guys from NGC, NEC and Hasley Crawford. Well, we are not so accustomed to celebrities visiting Chatham because we have also been referred to, on numerous occasions, as being behind God's back.

There Mr. Hughes and these guys from NEC and NGC had a beautiful presentation, but they were frightening everybody in the school that day. They had no regard for the village; they had no regard for the environment and they had no regard for the people that had lived there like my sister and I who have lived there for generations.

They said that our village would be changed, so prepare yourselves. The time span in which our village would be changed would be three months. This was December 2004. The EMA was supposed to grant the EIA in March 2005. Now, when we started to dig in to this process—because I found this very wrong—we realized that their process was flawed which is something that has kept on repeating itself. This symposium we are

at here today is flawed. This is not a dialogue, this is under conditions of Alcoa, the government and the energy sector.

Okay, the Chatham Industrial Estate was not cleared in March 2005; that is when the protests started, that evening in December, 2004. We found out that NEC, along with the EIA and along with Alcoa had to do a wet season survey, a dry season survey, a public census and all kinds of things that we were not aware of. But if we had not stood up and raised our voices to be heard a little bit Chatham would have been cleared in three months and the same stupidness that happened in Union Village would have taken place in Chatham.

I can go on and tell you how the struggle has continued and has grown bigger and bigger. I am so glad that the eyes of the peoples of Trinidad and Tobago, citizens here, have opened to this false, big time stealing and "ratchafee" that is going on in this country right now when it comes to this aluminium smelter industry that is being forced down our throats. We have said on many occasions, in many consultations, with Oyebode, Hughes, representatives from NEC and representatives from the government that we do not want any smelter in Chatham. Why are you people not taking our views into consideration? We are the ones that have lived there. We are the ones that have developed the place and we know what we want. What we want is not a smelter.

I have realized now that we can shout as loud as we want to you guys and you would not listen to us. The reason being that we are just collateral damage. You have no respect, compassion, empathy or sympathy for us. Therefore, the aluminium, the money and the gas is more important than the citizens, lives, the eco system and the environment. That hurts me.

Our friend from South Africa, from CSI Environmental Assessment was trying to compare Chatham with South Africa, the poorest part of South Africa? Let me tell you something, Mr. Saith, as well as Mr. Oyebode and Mr. Hughes, Chatham is a very rich community. We are not impoverished. We have everything we want and we have been independent for hundreds of years and would keep on being independent. That is why, when you guys came down there Chatham was not a place you could just hoodwink and get through.

The struggle would continue and we are not going to back down. We are going to fight with everything we have, by all means necessary, to preserve our village, because we know—maybe you guys do not know; you guys are graduates and have degrees, but you guys should come out of the Prados, take off the air-conditioning and take a walk in the road in Chatham, then you would see how beautiful and what it is I fight for.

Thank you.

Mr. Chairman: Thank you, very much. We have time for a few more discussions. The idea would be to close the symposium at 6.00 p.m.

Mr. Raphael *Sebastien (Cedros Peninsula United):* I think the speaker from La Brea made the case for synergy. To a great extent a lot of what has been going on here today is very abstract as far as the real situation is concerned in the Southwestern Peninsula. Whereas we are dealing with and discussing the whole question of aluminium smelters, the development strategy entails much more than one aluminium smelter, two aluminium smelters or even three aluminium smelters. As far as we are aware or as far as information coming out of the EMA is concerned, on the Alutrint site, in addition to the Alutrint smelter you would also have three mega fertilizer projects involving urea, ammonia and nitrogen as well as a couple other industries. Is that not correct?

When you consider the fact that you also have sitting next to that the LNG Complex with four trains so far and I think there is plan for a fifth and maybe a sixth train. Then you go down to Chatham where there will be two smelters in close proximity, plus a host of other heavy gas-based industries that are to be located on the proposed 3,000 acres site, you know it is important for us to synergize all the data, all the information for it to really begin to make sense about what we are really dealing with. You see, I do not know if there is any country in the world in which you have such a mix and such an agglomeration or concentration of such heavy gas-based industries in such a small area.

The gentleman from Norway made the point that they have seven smelters but I think Norway is a far bigger country than Trinidad and Tobago. Therefore, much of what we are saying here today, I would like to know if there is any scientific data; can you provide scientific evidence or scientific data that the mix of industries, the concentration of industries in such a small area; can we give any data to validate that it would not be

dangerous to the health and environment of the communities in that area or for the whole country.

Another fact is you have to take into consideration what is going on at Point Lisas. As far as I am aware, we have done no carrying capacity study of Trinidad and Tobago nor is there a carrying capacity study done for the Southwestern Peninsula.

The Prime Minister recently made this statement at a post Cabinet conference that we have room for only nine more of the mega industries and after that there is no more. I want to know what criteria he really used for making that kind of decision; what information; what scientific data. We just have to believe that what they are saying is correct. It is as though you are making the Southwestern Peninsula into a human laboratory for some kind of exotic experiment where you know you could collect and gather information or data to apply to other countries. If there is a situation, if there is any part of the world where you have three smelters plus the mix of industries that we are talking about, where you can draw from evidence on the table and say this is what will happen or this is what had happened. All you are talking about is how we can probably manage the risk; but managing the risks is not eliminating the risks. We are talking about what could possibly happen how you could go to the EMA for appeal but when you are dealing with lives and people are dead, there is no appeal to be made after that, Sir.

On the energy side, what we find today is that information is that Exxon Mobile, for example, has recently reinvested over $10 billion of its annual profit in its own shares. Shell and Texaco likewise, $2.5 billion; and that is the case with most of the big oil companies who are hoarding and who are rationalizing the distribution of their fossil-based energy to maximize its longevity as well as to maximize prices. Why are we not taking a cue from that to see how we could probably do the same with our scarce energy resources? Why are we intent upon subsidizing unsustainable industries at the expense of our future generations to come? Mr. Saith could probably tell us what is the master plan for the oil and gas that we have.

In our National Environmental Policy there is the concept of environmental justice, I suspect. I do not know if the concept would apply in the same way as it applies in other parts of the world, like in the United States. It is something that President Bill Clinton had to deal with recently. What you found was that industries were being placed

in minority areas; harmful industries were placed in areas that were basically defined as sacrificial areas; therefore, the communities there were up for sacrifice. They were marginalized communities, poor communities, communities that were politically impotent and could not address their own needs and wants, given the nature of the status quo and the power of the political establishment.

It seems to me that we have a similar situation emerging in the Cedros Peninsula. We are an impotent community; we are a weak community, marginalized in many ways and therefore we do not have any kind of representation to talk about; they talk down to you. I mean, you have a situation where you can make a case for environmental justice, in my mind. A sacrificial area, a community to be sacrificed and, therefore, if it comes to that stage, may be it is one aspect of the law we would have to investigate. It is not just a question of environmental justice, it is justice. Thank you very much.

Mr. Anson Barclay (Chatham Environmental Protection Group): I just want to make an observation with respect to the Head Table. We talk about local content in everything; somehow, although we have representation locally from the University of the West Indies and the University of Trinidad and Tobago, we had no direct input or presentation from those people present with respect to this aluminium smelter baring the economic view.

With respect to the industrialization of the Southwestern Peninsula, have we fully studied the impact of the area with respect to health, water and transportation services? I just want to outline, knowing fully well that our health services are stretched; Point Fortin really does not have a hospital per se that is able to serve industrialization of the Southwestern Peninsula. We have been hearing budget presentation after budget presentation the building or the rebuilding of the Point Fortin Hospital but it is just being carried over from budget to budget and not even a sod-turning ceremony has been held in Point Fortin.

When we look at the water situation, daily we can see the protest taking place all over the country; yet we have a commitment from WASA to the industrial estate of La Brea to supply them with water available or the necessary quantity of water 24/7 and it leads me to ask the question: which is more important, people or industrialization? The people of La Brea and environs - say what they want – suffer tremendously for water; and

I find it strange that WASA cannot make a commitment to the people of La Brea, which is a strong PNM area, and promise them water 24/7. Which is more important?

If we look at the road network, there is no real road in the Southwestern Peninsula for the increase in vehicular traffic that this industrialization is going to present. Somebody is going to say there is a Master Plan to build the highway. I have been hearing the highway construction for over 20 years and I do not think it is going to be fast-tracked fast enough in the manner in which they want to industrialize the Southwestern Peninsula.

I am saying we need to look at these three issues; the health issue, the Government or the Health Services will have to start doing baseline studies and I want to start from 10 years ago, coming up the road and continue maybe for the next 30 years so that we could fully understand the impact of industrialization of the Southwestern Peninsula. WASA has to speak to us, sometimes we get water two or three times per week; and when you send all this water to these industrial estates, how are they going to compensate the people with additional water supply? I do not know what is their programme – they are drilling wells – if they are going to set up a next desalination plant. Why do you not set up a desalination plant if you want to have an industrial estate in that area, so that you would see less protest for water in that area?

The road network leaves much to be desired and we are seeing a lot of patch work taking place when you look at Mosquito Creek coming down south. We really need a highway.

A connecting road I want to look at is from the Dunlop Roundabout to the Cap de Ville Main Road, that southern main road there. A contract was signed more than 18 months ago for that roadway; that road has stopped and not even a road engineer has seen it fit that the contractor has dug the road and there is a steep precipice – and I want this to be said on television - there are no warning signs to motorists; there are no warning signs to pedestrians; there are no warning signs whatsoever but there is a sharp verge in the vicinity of New Village area. I want to know what is going on with that project. Thank God there is nobody here to tell me shut up today so I can say what I have to say. Thank you very much.

Mr. Chairman: Thank you. We will have one last presentation and then we need to wind up; it is almost six o'clock. Who is the next person?

Mr. Elisha Gool *(Union Village):* I have one question for Mr. Saith and just a brief comment. Mr. Saith, in outlining your points to determine criteria for selecting sites, I do not think that anything was mentioned about the safety of the community – please correct me if I am wrong. For example, the aluminium smelter site and the petrochemical industries are sited north and west of the community of Union and Vessigny.

In other words, in case of a natural disaster, you are bounded in north by the proposed aluminium smelter plant, you are bounded to the east by the proposed petrochemical industry, you are bounded by the west by the Gulf of Paria which leaves one in. In case of a natural disaster where you probably might have fluorides emitting and gas-based industries are hazardous chemicals, what is the alternative plan to deal with such event if it does happen? We think that is a serious concern when identifying sites for industries and the fact that a main road passes through the industry, site A and site B. Now, I am not a planner or a technocrat but from where I am standing, I believe that is very poor planning, to have a major road passing through an industrial estate. That is my question to Mr. Saith.

My comment I want to make is one to my colleague earlier from La Brea who said that La Brea people want the aluminium smelter. Well, Union is a little community from where the industry got its name and we are saying that we do not want an aluminium smelter. Also, I can remember that when the public consultation was held at the Vessigny School when Alcoa was there, 99.9% of the people who attended that forum were against the smelter. My observation is I cannot see the change now really.

Mr. Chairman: Thank you very much. I think we need to wind up the proceedings but I promised to give members of the panel an opportunity to have a brief final comment, if they so desire.

FR. Michael Moses: Mr. Chairman, can you allow me one minute, please? I felt that this symposium was well executed. I compliment the speakers.

I really feel that what Prof. Dennis Pantin said was very crucial. If we do an objective study of all the speakers, all the presentations, it should cause the Prime

Minister and all the powers that be objectively to hear that there was clear caution, a desire to step back and look at holistic sustainable development.

I think that we saw that Alutrint is a bit different from Alcoa. We can also look at that as well and to give a just settlement for New Village. Thank you very much.

6.00 p.m.

Mr. Gary Aboud: [*Fisherman and Friends of the Sea*]**:** I want to respond to the PNM activist who spoke about Movie Towne. Fisherman and Friends of the Sea led an environmental movement down at Movie Towne. We stayed there for five months and we are very proud of it and we think it has given birth to a lot of current activities. Perhaps the gentleman was not aware.

The second thing is that he spoke about no one making noise about the Plipdeco estate. We have been developmental activists for the past 10 years and we have publicized—perhaps the political activist is not aware that the Farabi Ramroop and the Farabi Charles reports on comparative mortality rates in chemical industries in Point Lisas compared to Toco, as a stable population. I understand, completely, that La Brea needs development. I support La Brea regardless of which political party is activating for its development, but La Brea is not Trinidad and the national interest must come first. We need to know what is the price of gas and how much we are losing to Alcoa and if the wealth that is generated, firstly, is sufficient to justify the degradation and premature death that the activist will face.

Secondly, we need to know that the planning procedure is legal. We cannot have a Cabinet breaking the law. According to Benazir Bhutto when she spoke to George Bush, she said when a leader breaks a law, every citizen takes liberty in breaking every law in every corner of the country.

Thirdly, proper alternatives must be examined. I would like to challenge the political leader of the PNM to a referendum mechanism so that the public can decide. Because, the political activist shouted out, our brother in the back here that 0.5 per cent of Chatham does not want the smelter. I think that should be challenged and we should challenge the ANSA Mc Al poll.

Finally, I would like to say that if we are to proceed with the 2020 industrialization vision that the government has privately created, then the government

must prove to the people that they are acting responsibly in terms of procedures such as, for example, the Atlantic LNG is in Point Fortin and the Certificate of Environmental Clearance stated that they must have emergency training in evacuation procedures. Three years ago we had an accident in Techier Village. People were running around like chickens without testicles. There is no planning procedure; there is no bunkering facility and there is no alternative site. Point Fortin is left defenseless in the event of a gas explosion.

There are no ambulances; no hazardous materials fire fighting vehicles for Point Lisas, Point Fortin or for anywhere. There are insufficient clinics and the one that we have close at 4.00 p.m. What sense is it to have a clinic that closes at 4.00 p.m. if you do not have an ambulance to get people there in the event of an accident? Just imagine 110 years or 108 years after we started exploring oil resources we still do not have any coordinated emergency response in the event of a spill. That is for oil, gas and smelting is far more dangerous.

If the government, perhaps, would act responsibly and treat with the existing dangers that the population faces—God forbid, it may just be one in a million possibility that an accident happens, but when it happens who is going to account for the 10,000 lost lives?

Mr. Chairman: Thank you, very much.

Mr. John Stolymer: [*Conceptual Artist/Ecologist*]: Future generations are going to look back at this time and call it the great turning. More and more people walking away from the industrial growth society. Three hundred years of industrial revolution created huge outpouring of creativity which is being stymied in recent times by extended patents, but this industrial growth society, the culture of maximum harm, started to come apart. In the 1960s Richard Carson pointed out that we could no longer continue throwing chemicals into the environment, DTT was being found in the eggshells of rafters.

Around that same time, of course, we started seeing agricultural pesticides accumulating in water table on the agricultural lands. Predication of climate change caused by greenhouse gases came out in the early 80s. Now we are seeing that the oceans are filled with microscopic particles of plastic that jellyfishes are mistaking for plankton and that is coming up the food chain. Plastic has a biodegradable half life of

thousands of years. The human population growth curve is rising exponentially and our leaders, with their aggressive inferiority complexes aspire to world class status.

What we can expect within the coming decades is ecosystems collapsing. It is time for us, as a people, to make a real commitment to decentralization; self-sufficiency of our bioregions; make a goal of having organic agriculture and ecosystems rehabilitation; abolish corporate personhood.

We are completely, lovingly connected to all life on earth; the solar system, the Milky Way and the intelligent, creative, evolving universal continuum. We need to discharge the emotional distresses inherent to our rigid, exploitive hierarchic cultures that get in the way of us directly experiencing this reality. The world is a sacred place and you, we, humans belong in such a place.

Thank you.

Mr. Chairman: Thank you, very much. Any comments from the panel.

Prof. Pantin: Mr. Chairman, everything I have heard today leads me to, in a sense, maintain my conclusion which is that we should really draw on the Japanese philosophy, let us make haste slowly. Let us, therefore, make a pause in terms of these smelter decisions for a cause. The cause being the future, including the future of the children of this society. It does not mean, I would add, that we may or may not ultimately decide on smelters, but let us not rush into these decisions until we can explore all the opportunities.

I would suggest, for your consideration, a holistic planning framework which, perhaps, needs to begin with the question, as my colleague was saying to me, how do we develop a system of trust in the society across the spectrum. Because if we do not have trust, then, whoever is in power, some people automatically take positions one way or the other; either supportive, not supportive et cetera. Let us find a way, therefore, of coming up with a framework and there is only one way I know to do that. It is not in a big meeting like this, it is in a series of smaller meetings where every one can have a chance to speak and it may have to go on for weeks, months or even years.

Thank you.

Prof. M. Khare: Mr. Chairman, I would like to make my recommendations, comments or conclusions, whatever you want to call it. It is implemented on the basis of the

speeches, experts and lectures. Particularly, above all, on the basis of the very informative and critical feedback from the audience.

I am very crisply putting my action points like this under different headings. What we should do for the smelter if it at all comes up in Trinidad.

1. The smeltering technology: My recommendation is that there should be a prescribed maximum size of the plant based on assimilating capacity of the area.

2. The fluoride emissions: Formulation of fluoride emission standards from every part of the aluminium production plant, whether it is pot room, anode baking or carbon based section.

3. The MBN Fluoride standards: The formulation of MBN fluoride standards based on effects on plants—not on humans, I am stressing. I repeat, effects on plants which are thousands times sensitive than the humans. So, it will be a conservative standard but it will be very safe looking at the fragile ecology of this country.

Formulation of foliage fluoride standards: How much the assimilative capacity of each plant increases surrounding the area before it dies after the emissions of fluoride comes up from the proposed smelter.

4. Exposure standards: Exposure fluoride standards concentration must be formulated based on threshold level and time weighted average. That if a worker works for eight hours, 12 hours or four hours, on the basis of that the exposure standard must be formulated. That is the WHO norms. Not for only fluoride, but for pollutants like polynuclear aromatic hydrocarbon and polycyclic organic matters.

5. The fluoride consumption: The prescribed fluoride consumptions per tonne of aluminium produced to limit the fluoride emissions in the ambient air, that is very essential, I feel, that that should be specified.

6. The management of the spent pot-lining which should be formulated for safe storage against any disaster, what should be done until it is shipped or until what is the further plan that the principal of EMA has decided.

7. Next is the waste treatment, clean production strategy must be adopted to minimize the waste at all levels of the production if the smelter plant comes up.

8. The buffer zone design: On the basis of the application of the coal pot model or the model which our expert lecturer has presented. I think we should try to

design a buffer zone consisting of all flora and fauna which might have been destroyed due to the construction of the smelter in that particular zone; not to use as a protective area against the pollution, but also for the public to come as a recreational area between the smelter and the land.

Thank you, very much.

Mr. G. Goddard: Dr. Khare would be pleased to know—a number of people have asked—that these issues are called for articulation in the EIA. The process requires that the applicants in both cases demonstrate compliance with World Health Organization standards for hydrogen fluoride and other materials; demonstrate compliance with other standards. It requires that issues raised about disaster preparedness and emergency response be thoroughly evaluated to see whether or not these facilities can cause problems that are beyond our capabilities and what is the chance of that happening.

The issue of carrying capacity, a very important issue – I raised it earlier - has to do with especially long range transport of air pollutants and what effect it will have on the Gulf of Paria and those places. We are evaluating those issues. We go beyond Prof. Kenny's concern about the link between ports and smelters. We go beyond the link between intrinsically linked facilities and the smelters that they apply for. We look as well at other facilities that have nothing to do with the smelter, other industrial plants in the area.

We will be expecting the EMA to look at emissions arising from any reasonably foreseeable future activities of existing facilities like the LNG facility to see how those emissions mix, where they mix, if there is a risk to the immediate plant environment or even further away. We will be looking at several issues similar in the Union Estate facility where there are other chemical plants; we will be looking at the pollutants of the mix.

So the issue of having the application separated is not a fatal flaw in the process. We are doing communicative impact assessment which addresses that and I think that our organization, the Board's chairman has to make these decisions in the context of the rule of law, in the context of sound science, so arbitrary decisions related to which applications we should accept or reject are not in our purview, we have to operate within the law.

I made a statement earlier about having flexibility with regard to the standards because there are no rules and flexibility is significantly constrained. We are operating under the National Environmental Policy which speaks to the fact that where there are no standards we have to use international standards and I specifically mentioned the rules of the organization. We can hopefully a reputable body of people who can spend time and effort to develop the standards and we intend to make sure that those are enforced.

I want to encourage people to participate. I am extremely happy about how the environment has come to the forefront through this process and we hope to have continuity beyond the smelters in terms of people participating with us in making decisions. We hope to have continuity in the development of those areas regardless of whatever decisions we make on environmental issues.

There are lots of other things I wanted to speak about regarding the applicability of the Basel Convention, the fact that people are shipping waste out of Trinidad and Tobago to the United States all the time. That is how we manage a lot of our waste in Trinidad and Tobago. The laws relating to the Basel Convention speak to other countries having to give permission if you are landing at their ports. It talks about most people just leave it as long as you are not taking if off the ship. So, transit and imports are what people have to get permission for. Other than that, there are hazardous materials moving up and down the Caribbean every day. I think there are lots of other issues to clear up and I think we will get another opportunity to do so.

The EIA is a very useful tool, a very participatory tool, stakeholders will have several opportunities, as they have had in the past, to contribute to the process and we look forward to having continuity in this regard. *[Applause]*

Mr. Chairman: Dr. Coombes.

Dr. Victor Coombes: I think today's proceedings have thought all of us something. I have learnt a lot. I think that if we go back to CLR James' book "Beyond the Boundaries", we can symbolically recognize that this goes beyond the smelters. I was very much impressed by the presentations by the McGuire/McCree combination. *[Applause]* I was impressed by that because the sociologist perspective is very often ignored by scientists - by scientists, I mean the physical scientist and the dialogue scientist - and that did strike home to me.

Having worked at Texaco, Trintoc and Petrotrin for my entire professional career of 26 years, I could resonate with a lot of what those two speakers said. One of the things that attracted me to work there was the fact that there was a hospital, there was a school, there were golf courses, there were swimming pools for the kids and all of that. That model of industrial development/community enhancement, I think, we should be revisiting.

As far as the health aspects are concerned, as I said in my remarks earlier, there are definite hazards and there are definite risks in these smelter operations; however, those who have gone before us have been able to manage most of the hazards and have been able to manage most of the risks, and therefore, once we learn from those who went before, we should be in a position to put structures in place to ensure that our ambient levels, our hazards, our exposures are at levels that are tolerable and below international guidelines.

For example, many people may not be aware that with the OSH Act implementation, the Factory Inspectorate, the number of inspectors in the Factory Inspectorate has moved from eight to thirty-eight over the last six months. I find it very unusual that information has been relatively absent in the media. In order to manage compliance in an OSH context you require bodies on the ground, foot soldiers, equipment to be measuring and monitoring and many of the inspectors in the Factory Inspectorate have already been sent abroad for training in occupational safety, occupational hygiene in order to enhance those efforts.

I was also moved by the speaker who spoke about lack of health services in the area and I think that by having a holistic approach can also give us an opportunity to improve that whole complex of health, safety, environment, business, economics as a complex whole as opposed to leaving it as simply an economic venture.

I have done a mobility and mortality study of workers in the petroleum industry in Trinidad and Tobago and I have presented those findings at international fora outside of Trinidad and Tobago. I am saying that the Ministry of Health collects data on a daily, weekly and monthly basis in every single health centre in Trinidad and Tobago. This data can be collated in such a manner that we can recognize existing levels of mobility and mortality in all communities in Trinidad and Tobago.

Someone mentioned something about disasters and he was concerned about disasters. Well, having lived at the oil refinery for the last 26 years, in fact less than 100 metres from the fence, any process plant has the potential for fire, explosion or toxic release; and that is a reality of industry. The managers of industry must inculcate in every worker the capacity, the sensitivity to ensure that these disasters do not happen and have disaster plans in place. So that in Petrotrin, for example, we have earthquake disaster plan, fire disaster plan, hurricane disaster plan, toxic release plan and from time to time each of those plans are put into effect where there are drills which involve the community of Marabella.

So that I am an eternal optimist. I have been moved by a lot of the hurt that I have seen in some of the speakers, their concern, I could resonate with it. I still feel that with this level of participation and dialogue, whatever we have at present, we could improve on. Whatever we plan to do, we could improve on the plans and in the final analysis we should put Trinidad and Tobago first.

In closing I would just like to leave you with a quote from Confucius. Because I have learnt so much today, I did not get a chance to speak as much as I would have liked but I am sure there would be many other opportunities." Confucius said: "To know what you know and to know what you do not know is a sign of one who knows." Thank you. *[Applause]*

Mr. Chairman: Mr. Keul.

MR. ERIK KEUL: Well, first of all, I did not come here today to convince you to build aluminium smelters but my message is that a modern pre baked aluminium smelter combined with state-of-the-art pollution control will give you a safe working environment,. Pollution in the local environment whether from POYs, from PAHs should not be your sole concern. Aluminium smelters exist in other places in harmony with local communities, with agriculture, with fisheries, with tourism. I am just saying that you should be able to site a smelter in Trinidad if one is ever built so whatever you decide on; I hope you make the right decision. *[Applause]*

Mr. Chairman: Thank you very much.

Mr. Prakash Saith: I, too, have learnt a lot from this symposium. As you know, we have been discussing these smelters for the last two to two and a half years. I hope that

this is an on-going process and I hope that we will have an opportunity to talk a little more.

Just one quick answer. One gentleman raised a situation with regard to water, health and transport with regard to the new estate. I did not get the chance to ask him but I want him to know that these are all plans in the development of the new industrial estate. I do not know if he missed the session this morning but, as I said, WASA has already brought in the pipes and we have indicated to WASA that the community must get water before any industry.

With regards to transport, they have invited tenders for the new road network from San Fernando to Point Fortin. I just wanted to share that with regard to the question raised. I thank you all for your time.

Mr. Chairman: Thank you all very much. Let me extend a special thank you to each one of you this evening. I was quite impressed this morning; there was not a single empty seat in the hall which means that every single delegate that was supposed to be here was here and even up to this late hour, most of the seats are still occupied.

As the South Chamber President I am really grateful for the active participation, the quality of feedback, the opportunity for dialogue and these are the original objectives that we set when we just got into the hosting of this seminar. As you know, it was also done in collaboration with the University of the West Indies, the National Energy Corporation and the University of Trinidad and Tobago, so not all credit or blame should go to the South Chamber. I personally think that it has been a resounding success from where I stand. The most important ingredient is really your participation.

I would also like to thank all the presenters: the Minister of Energy and Energy Industries, Dr. Saith who is not with us but graced us with his presence, gave a good presentation of plans by the Government and stayed a long period of time from his busy schedule to at least, for himself, get some feedback and listen to some of the presentations and that was quite rewarding.

Fr. Moses, many of you do not know he was quickly pressed into service this morning and responded on the spur. I thank him very much for the blessing. I think it has had a lot to do with the outcome.

Let me just thank the expert panel: Prof. Dennis Pantin, Prof. Mukesh Klare, Dr. Rene Monteil, who had to leave a short while ago, Mr. Glenn Goddard, Mr. Frank Look Kin, Dr. Steve Smith, Dr. Victor Coombes, Mr. Erik Keul and Mr. Prakash Saith. I think you will agree with me that the very short space of time we had to put together this panel, we have been extremely successful in attracting and securing some of the best people in the country. Thank you very much. *[Applause]*

It was also quite an achievement for the Chamber and the organizing committee to quickly attract the quality of panelists, the quality of presenters to this symposium.

As I indicated this morning, we kept an open mind on what presenters wanted to talk about; there was absolutely no constraint except time and I am sure you were not disappointed. We wanted to present as much factual information and expert opinion as possible and I am saying that in the limited time that was available, they all did an excellent job. By name just once more so that you will remember the contributions that they have made: Mr. Colin Pratt, Mr. Paul Lochner, Prof. John Spence, Mr. Gregory McGuire, Dr. Roy McCree, Prof. Julian Kenny, Mr. Joseph Scire and both Mr. Steve Fruh and Dr. Lee-Jones.

As I said, we have their presentations which will be e-mailed to al of you. You will get hard copies and you can access those presentations on our website, so the information is there. Dr. Jones was available and in fact stayed in her office for several hours, since about ten o'clock this morning and we were really waiting for the right time but it was our time and it was only, unfortunately, in that critical moment that she had stepped out for a few minutes. We really need to give her special thanks in her absence because she did wait more than five hours trying to make a direct contribution. *[Applause]* We will ask the Chief Executive Officer of the Chamber to convey our very special thanks to both of them.

Dr. Oyebode Taiwo has laid out the facts. As I said, there was absolutely no restriction. Presenters could have said what they wanted as they saw it and that is what each one of them did. I enjoyed the presentations very much.

I also want to point out that despite the definition of the structure of the symposium that we planned, we, on the spur, decided to amend the format of the presentation to give as many participants an opportunity to make a contribution. We

have received more than 100 written questions and requests for comments and, as you would appreciate, it is almost impossible from two points of view; time and it is also difficult to limit presenters to two minutes if they have an important point to make or if they have a sincere point to make, which I think was reflected in many of the contributions. It is a very difficult task to curtail someone who is making an impassioned, an honest point or a heartfelt point.

This is why we were unable to treat with all the questions, but we have decided that we would take each one of the questions or comments, put it on the website, it would be available to all of you so that we would want to continue to ask you to give us feedback and share feedback with yourselves, with all of us and with the national community so that we can further the objective of being better informed about this industry.

I thank you very much, and I also thank the contributors from the floor—although they were quite passionate at times, we maintained our civility. It is something that is remarkable for a large crowd like this. I say a very special thanks to all of you.

I thank members of the media. As you know, we have had continuous coverage: CNMG, Talk City 99.1 and other media houses. This symposium had been carried very actively throughout the course of the day, sharing with the national community, this very important issue and this discussion that is taking place. Sometimes we are a bit concerned—I, myself, was concerned—about the quality of the reports, but I must say the media has risen to the occasion today and gave us sterling coverage throughout this event. I thank each one of the institutions represented here today.

I also thank members of the South Trinidad Chamber of Industry and Commerce. As I said, we have tried to put this together on short notice. It meant a lot of work for many of the members. We were ably assisted by members of National Energy Corporation, National Gas Company, University of Trinidad and Tobago and the University of the West Indies. There are several people who were working behind the scenes trying to assist us, make calls, establishing contacts and solicit papers. The list of names is very long, but I thank each one of them personally—they know who they are. I would not call their names, it is already late in the day. Thank you, very much.

The day would not have been what it was without the full support, cooperation and excellent service that have been provided by Paria Suites Hotel. You would appreciate that the accommodation is first class, the food and refreshments were excellent. I extend a special thank you to each one of them who assisted in the background.

So, one again, as we said this is just the start of the process. The South Chamber is quite pleased to have been a part of this process and to facilitate much of the furore. I thank you for giving us the opportunity. All that remains is for me to wish you a very pleasant evening.

Thank you.

Adjourned at **6.40 p.m.**